How do you think your organization looks to an experienced personnel builder? What personal characteristics do you think a professional selector of men puts his finger on first and last? These and many more controversial points are outlined and discussed in a series of articles by O. G. Van Campen, who knows first hand and has studied human relations in the coal industry. Organization Morale, p. 37, serves as a setting and background for the articles to follow. Don't read them if your blood pressure is high. . . . **Small output** is no bar to high efficiency through the use of mechanical-mining equipment. Streeter mine, Axial, Colo., is a case in point. Using one loading machine and two shuttle cars hauling from face to tipple, 14 men produce 200 tons in two shifts at this mine. This story will appear in an early issue. . . . **Co-op washing** of the product from ten small companies at Paris, Ark., results in fancy nut, chestnut, stoker sizes and carbon to successfully meet the competition of other fields in marketing the output from this group. Increasing demand for stoker coal by a discriminating market made the formation of this non-profit organization imperative. See p. 41 for details. . . . **1941**

(CONTINUED ON PAGE 7)

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TEXACO Lubricants

FOR THE COAL MINING INDUSTRY

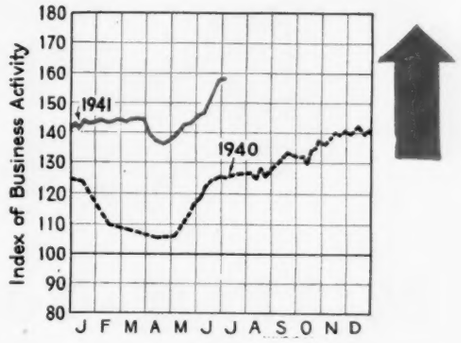
(CONTINUED FROM PAGE 5)

Model Mining Number is now in the works. With field surveys completed *Coal Age* staff is busy sorting and tabulating, writing and condensing the mass of information gathered from the eastern Ohio operations in Pittsburgh No. 8 seam for presentation in October. The reason for the selection of this particular field at this particular time is that no other district has made more widespread progress in mechanical loading in recent months than this one, and such modernized methods serve well to point the way for other districts who must, eventually, follow. . . . **Meetings,** gatherings of coal men, are reported in this issue. In Denver the Rocky Mountain Coal Mining Institute called spades spades and produced figures in full support, p. 68. At Pictou Lodge, Pictou, N. S., better mine ventilation was the chief topic presented, p. 72. At White Sulphur Springs, W. Va., the Central Section, A.I.M.E., and the Coal Division presented several subjects of direct interest, p. 78. When coal men meet they discuss many matters of importance to the entire industry; *Coal Age* editors are there to report what happened. . . . **Stripping,** treated in one article in this issue, p. 39, comes in for some cold-weather operating practices in an early issue. How electric heating units are used at the Fiatt mine of Truax-Traer Coal Co. will be published soon. Also in the offing is an article on boom maintenance at Ayrshire Patoka Collieries Corporation. Both live subjects.

HOW'S BUSINESS

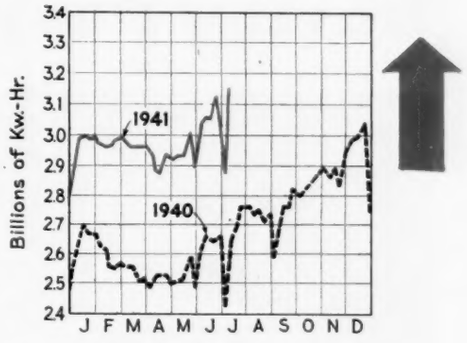
GENERAL BUSINESS CONDITIONS

Despite shortages of raw materials for defense goods, the country is still undergoing one of the broadest industrial expansions in its history, with steel hitting above 90 per cent of capacity for the eleventh straight month, and cotton consumption, shoe output and the physical volume of retail sales at all-time highs. The same is true of electric power, heavy construction, crude oil, machinery output and airplanes. *Business Week* Index (July 19) was at 159.1, against 159.0 the preceding week and 151.9 a month previous.



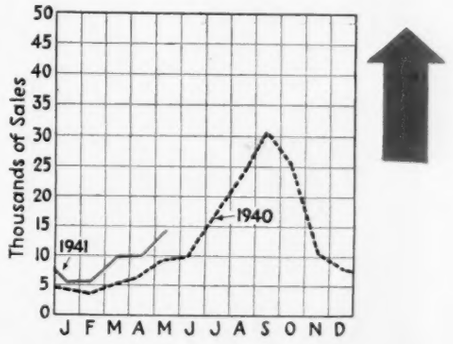
ELECTRICAL POWER OUTPUT

Production of energy by the electric light and power industry, according to the Edison Electric Institute, snapped back to an all-time high for the week ended July 12 following a sharp falling off during the July 5 holiday week. Production for the week was 3,141,158,000 kw.-hr., an increase of 18.5 per cent over that week last year. Output or other recent weeks was: June 14, 3,066,000,000 kw.-hr.; June 21, 3,056,000,000; June 28, 3,121,000,000; July 5, 2,867,000,000 kw.-hr.



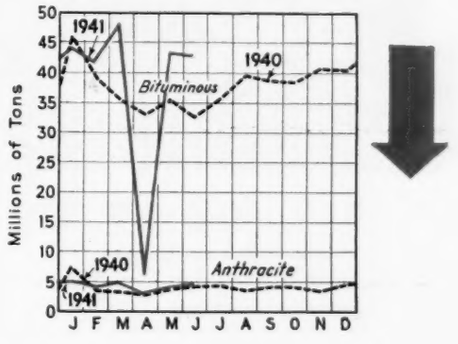
COAL STOKER SALES

Mechanical stoker sales in the United States in May last totaled 14,371 units (U. S. Bureau of the Census from 101 manufacturers), compared with 10,139 in the preceding month and 8,417 in May, 1940. Sales of small units in May last were: Class 1 (under 61 lb. of coal per hour), 13,349 (bituminous, 12,292; anthracite, 1,057); Class 2 (61-100 lb. per hour), 488 (bituminous, 464; anthracite, 24); Class 3 (101-300 lb. per hour), 300.



COAL PRODUCTION

Bituminous coal produced by United States mines in June last (preliminary) totaled 43,090,000 net tons, according to the Bituminous Coal Division, U. S. Department of the Interior. This compares with 43,400,000 tons in the preceding month and 32,400,000 tons in June, 1940. Anthracite tonnage in June last, according to the U. S. Bureau of Mines, was 4,886,000 (preliminary), against 3,858,000 (revised) in the preceding month and 4,492,000 tons in June, 1940.



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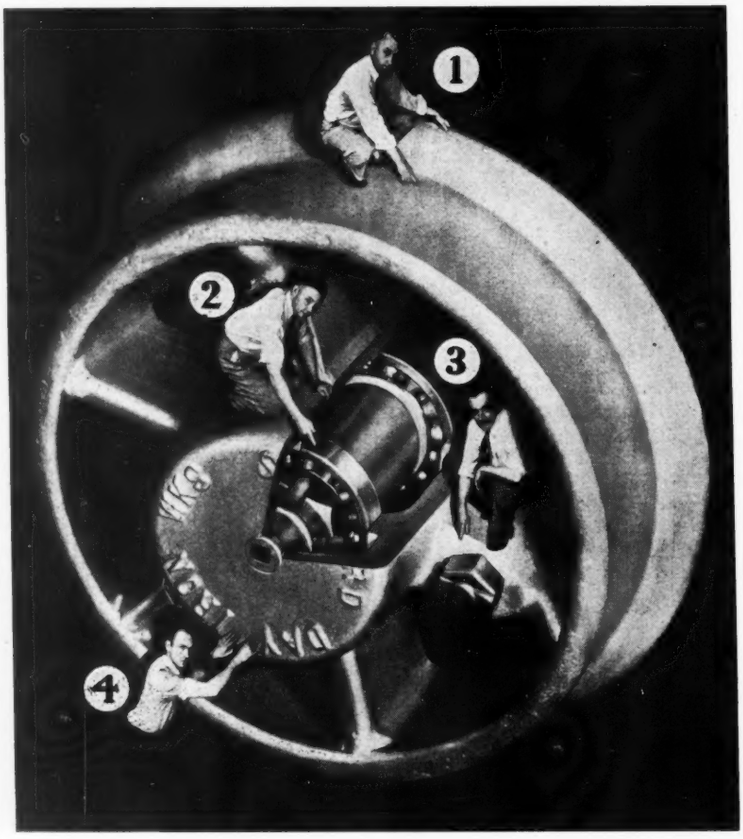

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DEVOTED TO THE OPERATING, TECHNICAL AND BUSINESS PROBLEMS OF THE COAL-MINING INDUSTRY

Coal Age

Established 1911 — McGraw-Hill Publishing Co., Inc.

SYDNEY A. HALE, *Editor* • AUGUST 1941

Pertinent and Impertinent

• WHILE Washington makes special priority provisions for hospital supplies, a manufacturer of safety equipment for mines is threatened with a plant shutdown because of difficulties in securing raw materials. Who said "an ounce of prevention is worth a pound of cure?"

• WELL! well! The coal industry is beginning to excite the favorable interest of financial commentators. "Prospects believed best in years" is the way one advises the investment-minded reader. This about-face, of course, is induced by rising demands for tonnage, with a modest orchid for increased efficiency in production.

• UNCLE SAM needs taxes and taxes are paid out of profits. So the present temper in Washington is to permit a reasonable return to business on current operations. If any industry or group, however, tries to recoup for the losses of past years, look out! Price ceilings will lower fast.

• EXHORTATIONS to the consumer to store coal "now" have been pouring out of official Washington in recent weeks. Fine! But how about a little more serious attention to making it possible for the coal industry to continue to carry the load? Little things such as man power, equipment, supplies—and transportation.

• INSTALLATION of increased generating facilities proposed by the Federal Power Commission to meet defense needs would boost capacity over 10,000,000 kw., with a slight edge in allocation to steam-electric projects. The hydro-electric portion of the program, says the commission, is based on "economically sound" projects. O, yes; the St. Lawrence project is included.

• COAL MINING is distinctly a blue-chip industry from the standpoint of average hourly earnings. Preliminary figures for May show bituminous, with an average of 97.3c., sixth, and anthracite, averaging 94.5c. per hour, eighth in a list of 109 industries. Workers in newspaper and periodical printing plants topped the field with an average of 106.6c. per hour. The average for all manufacturing industries was 72.6c.

• ANTHRACITE is in an ideal position to recover some of its lost markets this winter. What will happen to fuel-oil supplies and prices on the East Coast is any man's guess. Coke is a critical factor in the steel industry and furnace demands may eat further into tonnages normally sold for home heating. Handling the situation will call for wise leadership in the anthracite industry. The story of the goose and the golden eggs is still worth remembering.

• SHOOTING ON SHIFT has been sharply and persistently criticized for a long time by some safety experts. Yet a study by the Bureau of Mines—certainly no torrid friend of the practice—shows that only five out of 26 coal-producing States have statutory blanket prohibitions against such shooting. Eleven States have no restrictions; others have qualified restrictions or delegate authority to regulate blasting to State inspectors or mine management. Can it be that there are two sides to this question?

• TRANSLATE lost man-hours into dollars-and-cents costs when compiling accident statistics for the front office, suggests T. A. Walsh, American Optical Co. And supplement it, he adds, with a statement of what it would cost to install safeguards to prevent a recurrence of the accident. While Mr. Walsh's little homily deals with an eye-protection campaign, its basic theme is equally applicable to the reduction or elimination of other types of accidents. The humanitarian appeal is not to be ignored, but the hard-boiled approach to the pocketbook nerve is more potent than a play on the emotions.

Preparedness Pays

WITH THE SCARS from the conflict still burning, probing the causes of the now happily ended 1941 Appalachian wage controversy probably would be inopportune. Such examination may better await a further subsidence of the emotional inflammation which split Northern and Southern operators into two opposing camps. But one significant comment of the victor, published in an editorial in the *United Mine Workers' Journal*, de-

serves the immediate and continuing attention of mine owners in every producing field in the country.

The decision of the National Defense Mediation Board, stated the *Journal*, "not only confirmed the need of eliminating the 40-cent differential but accepted as accurate the union's figures as to the labor cost involved in the elimination. It was," it continued, "another indication of the fact that the United Mine Workers never enter a wage conference without thorough preparation of its case and that it bases its demands on facts and figures."

Some of the "facts and figures" possibly may be challenged by opponents of the union's program. And what deductions should be drawn from a given set of statistics frequently offers an arena for honest differences of opinion. The unchallengeable fact which goes to the roots of the situation, however, is that the union makes the study of data bearing on industrial relations in coal mining a full-time job and the operators do not. So long as this condition exists, management will continue to be at a disadvantage in wage negotiations.

If this condition is to be changed, there seems only one way to do it. Management also must make collection, study and dissemination of facts germane to the problem a full-time job. Individual operators obviously cannot do this without abandoning their management functions for the companies which employ them. The work clearly must be handled by and through a properly staffed independent fact-finding group organized along lines previously suggested in these columns.

Maximum Prices

WHETHER, in view of rising demands and stronger markets, price ceilings should be set on bituminous coal has been a subject of unofficial discussion for some weeks. Luther Harr, Consumers' Counsel, drags the question out in the open with a petition, filed July 23, asking the Coal Division to establish maximum prices approximately 10 per cent above existing minima. Meantime, the Coal Division tightens its control over prices fixed by marketing agencies and OPACS is building up a fuel-price section.

Fixing maximum prices, as the Garfield Fuel Administration discovered during the last war, is studded with sharp complexities. The profit phase, blandly ignored in the minimum-price structure, must be taken into account; that means individual costs—as distinguished from field averages—must be considered. No wonder people familiar with the pitfalls of the task are hoping the industry itself will exercise such restraint that official action will be unnecessary.

Making Progress

CERTAIN INDUSTRIES not ordinarily considered defense industries are just as essential to national rearmament as the manufacturers of war material. Indeed, without some of them, a successful national-defense program would be impossible. This fact is receiving increasing, if belated, official recognition in Washington. One of the most significant recent evidences of this recognition is the OPACS order of June 30 giving priority status for repair and maintenance materials and equipment for 26 essential industries.

This blanket order is much broader than the earlier priorities for freight-car and locomotive building and repair. In these earlier orders, deliveries of materials were wholly subordinated to defense requirements. The June 30 order not only places the needs of these 26 industries ahead of all other civilian requirements but also "prior to defense requirements to the extent consistent with the defense program as determined by OPM."

How much or how little this broadening may mean cannot be appraised until actual administration of the order by OPM gives a background of experience upon which to judge. OPM's order with respect to mining machinery was not issued until nearly a month after OPACS had made its decision and the ink hardly is dry. One its face, however, that order goes beyond what OPACS suggested and wipes out the limitation of this new application of an A-3 rating to maintenance and repair materials.

The OPACS order (see page 86) apparently was restricted to replacement in kind. Under its terms, if a mine wanted to increase efficiency by replacing a broken 6-foot cutter bar with one 7½ or 8 feet long, it was out of luck as far as the OPACS mandate was concerned. The OPM order is not so limited. It is issued, to quote the Division of Priorities press release of July 29, "to facilitate the production of mining machinery and equipment, which is of crucial importance to the defense program." We are progressing.

Coal Demands

FORECASTERS of bituminous-coal demands for 1941 have been in substantial agreement that consumer requirements would absorb 500,000,000 tons. This estimate means an increase of approximately 12 per cent over last year's total. During the first quarter, output was 13.3 per cent ahead of the first three months of 1940. As a direct result of the spring suspension, however, by mid-July the increase over last year had dropped to 5.1 per cent.

If the 500,000,000-ton estimate is to hold, production for the rest of the year must average approximately 10,650,000 tons per week. This is far less than the present capacity of the mines to produce. National Coal Association estimates current capacity at 12,200,000 tons. Considering the still untapped possibilities of multiple shifting in many potentially large producing areas, this capacity figure can hardly be called an overstatement.

Government agencies, apparently dubious of the ability of the railroads to handle peak traffic in the coming months, have been having a field day urging industrial and domestic consumers to fill up on coal in the next few weeks. It is sound counsel if intelligently followed. Adequate coal reserves are always a good insurance factor—particularly in areas where winter transportation is difficult. But panicky buying will not help and might bring on or hasten the very car shortage the appeal seeks to avoid.

FIRST OF A SERIES OF ARTICLES
ON HUMAN RELATIONS AND PERSONNEL BUILDING
IN THE COAL-MINING INDUSTRY

ORGANIZATION MORALE

Must Be Developed to Meet Problems Inherent in Changing Coal-Mining Picture

Mr. Van Campen, author of this series, is a specialist in the field of human relations with a background of more than twenty years' industrial experience in organizing personnel departments, selecting and developing superintendents and foremen. He has conducted practical courses in human relations and foremanship at many well-known industrial organizations, including American Telephone & Telegraph, Eastman Kodak, Otis Elevator, Pittsburgh Coal, Prudential Life Insurance, Rochester & Pittsburgh Coal, Westinghouse Electric & Mfg. and Western Union. He has lectured over national networks, been associate editor of Psychology Magazine and special lecturer at Stevens Institute of Technology.

By O. G. VAN CAMPEN
Consultant, Industrial Relations

OVERSHADOWING everything else in the coal industry is the need for constructive leadership. National-defense requirements for maximum output, the demand for a quality product, the need for trained workers and supervisors, and situations arising out of the demands of organized labor are cracking the crust of old established methods and exposing half-solved problems hitherto overlooked or deliberately ignored. Only men of vision who recognize the vital factors at work in this period of transition from hand-loading to mechanized mining can solve these problems.

Among these problems is the development of organization morale to give the worker a sense of worthful living and a feeling of security—morale that develops pride in workmanship and enables him to adjust himself to the changes that must come with modernization. A strong, high morale is imperative if management is to tap successfully the great source of potential man-power already available within the operating organization. Success or failure of any industrial program depends upon the tone and quality of organization morale.

Company policy as related to the human factor has been one of compulsion and demand. Inspection and penalty have been its keynote. Many of the top executives and many of the superintendents and general mine foremen have come up the "hard way"—and remained hard. The influence of tradition has developed a type of "boss" who is a strange combination of commanding officer, political boss and stern "dad."

The coal industry is an industry of action, strenuous effort—and hard reality. The very atmosphere in which men work tends to suppress emotions and sentiment. Confronted by the forces of nature as these men are, human factors are all too frequently blotted out. Man often ceases to think creatively—and only conforms.

A few years ago I visited a mine in Pennsylvania to start a course in foremanship training. When I entered the room firebosses, assistant foremen and general mine foremen sat stiff and frozen, faces almost without expression. The superintendent solemnly arose from his place at a small table and said: "Men, let's rise and welcome the speaker." Like automatons the men stood up and mechanically clapped their hands. After a few seconds of this lifeless demonstration the superintendent just as solemnly said: "Men, be seated." Then he stated that "the company has sent this man here and I want you men to pay attention. I don't want any man to leave the room until the meeting is over, whether you are interested in the speaker or not. When the time comes for questions, see that you ask 'em."

Of course, the meeting was a "flop." There weren't any questions. Every man in that room was afraid to "stick his neck out." The superintendent hit that meeting like a "fall of roof." These men who had passed stiff examinations for their certificates had forgotten how to feel a sense of pride in their official standing because they were victims of the wrong kind of management.

"A short time ago," said the superintendent of another mine, "I called a meeting of mine officials to discuss the causes and handling of grievances. I told the men to talk frankly. Then what did I do? I jumped all over the first poor devil who took me at my word. I simply lost my head. When I realized how I had acted, I felt like a damned fool. There was only one thing left to do. I came out flat-footed and told the men right there and then that I had acted like a damned poor superintendent.

"In nine cases out of ten," he continued, "we mine officials are the cause of grievances. We handle men the wrong way. They become antagonistic

—and pass their antagonism right down the line."

This man is a good superintendent. He is honest enough to look himself straight in the eye—and big enough to admit his own mistakes.

Supervision cannot ignore the feelings and attitudes of the workers without paying the price. Men get peevish over constantly repeated instances of what they regard as lack of consideration of their ability, their comfort, and their "rights and privileges." The basis for most of the friction, the cause of most of the grievances, is how the workers feel toward management.

On another occasion, as I was walking through a heading with a superintendent and general mine foreman, the superintendent suddenly stopped. Turning to the foreman, he asked in that skeptical manner so familiar to the men in the mines, "How wide is that entry?"

"Why, it's the regulation 20 ft."

"O. K.," said the superintendent: "let's get the tape measure."

The foreman produced his tape measure and attempted to lay the tape across the entry.

"Just a minute," said the superintendent, "I'll hold the business end."

The foreman's face flushed with embarrassment on having his veracity questioned, particularly in the presence of a stranger. Measurement showed the entry had been driven 25 ft. The superintendent had proved himself correct, but he had humiliated the mine foreman. This method of handling men can hardly be expected to build morale.

The Wrong Way

Top executives of another company were called into a meeting to hear the details of a training program which included establishment of an industrial relations department. After the speaker outlined the program the president took the floor. Said he: "Gentlemen, I am skeptical of the whole proposition; it sounds too idealistic and sentimental. However, at the moment I won't oppose it, but my fingers are crossed. You've got to prove to me that the thing can work, and, if it does not—look out!"

The program had a pleasant beginning. For a few short months "a good time was had by all." But, with the negative attitude of top management, it finally went to pieces.

Morale is further lowered by inconsistencies in management itself. Staff departments, for example, are created and allowed to operate as independent agencies, frequently overlapping one another in their relations with the supervisors at the mines. Each department makes its special "drive," exerts its particular "brand" of pressure, and the supervisors fear to call upon them.

Staff-department methods sometimes tear down more than they build. The procedure seems to be to wait until trouble arises, then attack it. All too frequently a section foreman does not know he is in trouble until he gets the inspector's report. In his rage at its sting, many a foreman has torn it to shreds. The destructive effect of these reports upon the supervisory force often lasts for days; yet these men are expected to maintain standard performance and keep the mines safe.

O. G. Van Campen

Management is not sufficiently impressed with the importance of plant and job instructions, particularly as related to morale.

Both the degree and quality of morale are highly significant in accident prevention. How a man feels will definitely affect the safety of his actions. His attitude toward his superiors and his pride in his work will determine whether or not he is very much interested in safeguarding his own life or the lives of others. For the most part, the supervisory staff is a deeply conscientious group. It takes them weeks to get over their concern over a serious accident and from three to six months to recover from the depression resulting from a fatality.

There is room for much improvement in the methods employed to promote safety. There is too much "scare copy" in house organs, bulletins and posters. Most of the material emphasizes not the preservation of life and limb but the horrors of injury and death. The strong appeal made to the fear emotions frequently destroys the worker's confidence in his ability to be safe. Much of the material used in safety drives actually undermines morale.

Several of the more progressive coal companies are keenly aware of the importance of the human factors and their influence upon production. These organizations are giving as much attention to research in the field of human relations as they are to research covering technological and mechanical developments. Changes are being made in company policy and organizational set-ups to provide for new programs of industrial relations.

The Right Way

When the new industrial relations program was introduced at one such company it was given the solid support of top management. Great care was taken at the outset to prepare the way for the schedules that were to follow. Meetings were held with line and staff officials, at which the objectives of the program were carefully explained. Under the guidance of the operating vice president, the cooperation of these officials was definitely secured. Meetings were then held at the individual mines so that every supervisor, from general mine foreman to fireboss, might feel he had a part in the program. The worth of the individual was clearly established, and proper recognition of the official standing of each supervisor was emphasized. Preliminary short courses covering such subjects as fundamentals of human relations, public speaking and foremanship were given to the superintendents and mine foremen.

This group phase of the program culminated in a dinner that will long be remembered by every supervisor in the organization. There was no floor show or any other form of nonsense. The men at that meeting enjoyed the best ever of good fellowship and profitable discussion. Top executives that evening set in motion the influences which went far toward the success of the entire program. A new company spirit—a new organization morale—was born. The men felt a new faith in their company, a new pride in themselves and a new driving power for the hard work ahead of them.

[*Subsequent articles in this series will discuss job analysis, selection of employees, training of operators, mechanics, etc.; training for supervisors, methods of upgrading and promotion, and training for accident prevention.*]

34-IN. COAL SEAM

Recovered by 19-Cu.Yd. Stripper With 5-Yd. Loader and 30-Ton Semi-Trailers

An electric shovel with 19-cu.yd. welded alloy dipper and a front end specially designed to permit lengthening the dipper stick to handle heavier overburden in the future heads the equipment list at the new Robin Hood No. 3 mine, recovering 34 in. of coal under 35 ft. of cover. Sidewall holes are loaded with dynamite. Coal is handled by a 5-cu.yd. loader and 30-ton semi-trailers. These dump over a ramp into railroad cars in which the coal is switched to the Friar Tuck plant for preparation.

EQUIPPED with a 19-cu.yd. stripper, a 5-cu.yd. loader and 30-ton tractor-semi-trailer haulage units, the new Robin Hood No. 3 mine of the Sherwood-Templeton Coal Co., in Sullivan County, Indiana, 15 miles northwest of Linton, recovers an average of 34 in. of coal under 35 ft. of cover. Stripping eventually will be carried to 50 ft. at this newest addition to the list of mines operated by companies headed by R. H. Sherwood, of Indianapolis, and with that in view the stripper front end was especially designed to permit, among other things, lengthening of the dipper handle at some future date. The Robin Hood No. 3 product moves by rail to the Friar Tuck mechanical-cleaning plant for preparation and shipment over the Chicago, Milwaukee, St. Paul & Pacific R.R.

The No. 7 seam mined, as stated, averages 34 in. in thickness. The 35 ft. of overburden over the present working area is made up, in ascending order, of 8 to 10 ft. of light-gray shale (occasionally replaced by sandstone), sandstone, and then shale, followed by 3 to 10 ft. of clay and surface material. Beneath the seam is a soft fireclay. The shovel cut down to the coal on Nov. 19, 1940, and to date very little water has been encountered. Natural drainage is provided through one end of the pit, and any other water so far has been handled by 2½-, 3- and 4-in. Allis-Chalmers pumps (one each) with hose or spiral-pipe discharges.

The overburden at Robin Hood No. 3, where Clyde W. Grass is superintendent, naturally must be shot. Holes are made with an Allendale sidewall drill. Diameter is something over 4 in., and the usual depth is 40 ft. With the breaking back beyond hole depth secured, usual cut width is 50 to 55 ft. Where the burden is 35 ft. or more thick, hole spacing is 20 ft. The explosive usually is duPont 40 per cent dynamite in 4 x 8-in. cartridges, and the normal loading per hole is 175 to 200 lb. Because the sandstone ledge

Left, shots going off in a section of high wall at Robin Hood No. 3; right, how the bank looks after things settle down.

The stripper, with special front end, carries a 19-cu. yd. welded dipper.

Loading a semi-trailer with 25 tons of coal in the pit.

Haulage unit on the ramp ready to dump to a railroad car.

in the bank is seamy and tends to come out in large chunks, 60 per cent dynamite is used on occasions to insure breaking it up small enough for easy handling. Charges also have been split, with part about the center of the hole, to distribute the breaking effect.

19-Yd. Dipper on Shovel

Stripping is done by a Bucyrus-Erie 550-B electric shovel with 19-cu.yd. welded Man-ten alloy dipper fitted with Bucyrus-Erie snubbers to reduce door slap. The front end, as stated, was tailor-made to the property, and includes a 107-ft. boom and 63-ft. dipper handle. The front-end design and other shovel details permit adding 9 ft. to the handle in the future to take care of a thicker overburden. The stripper is accompanied by a John Deere farm-type tractor with homemade hydraulic-lift bulldozer, and also a combination tool and shelter house.

Loading is done by a Bucyrus-Erie 85-B electric shovel with standard 5-cu.yd. dipper. Shooting the coal is not required. The shovel can take a cut 45 ft. wide and still be within good working reach of the haulage units on a 15- to 20-ft. berm along the highwall. Rough cleaning of the top of the coal is done by a Caterpillar D-7 tractor fitted with a La-Plant-Choate bulldozer. This unit also is used in rooting out rolls, road work, moving equipment, and other miscellaneous tasks.

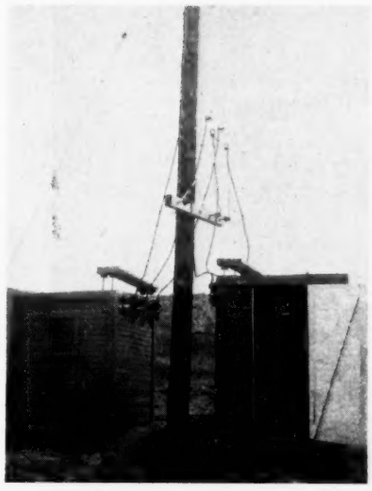
Haul With 30-Ton Units

Haulage is handled at Robin Hood No. 3 by Dart tractors (200-hp. Hercules "HXE" gasoline engines) pulling United Iron Works Co. 30-ton bottom-dumping semi-trailers. Three such units are in service. Semi-trailer loading, however, is limited to 25 tons, so that three just fill a railroad car, thus permitting charging between haulage trips. The pit is entered by an incline approximately ¼ mile long, on which the grade is limited to 3 per cent. Thereafter, the units operate on the coal. Average round-trip haul at present is approximately 1 mile, and will not exceed 1½ miles in the immediate future. Haulage units are housed and maintained in a combination shop and garage.

Coal is transferred from the pit-haulage equipment to railroad cars by means of a bridge, or ramp, over a loading track. A chute beneath an opening in the bridge conducts the coal to the car. Empty storage yards

above the bridge are laid on a 1½ per cent grade and will accommodate 50 cars. The loaded tracks (1 per cent) will hold 60 cars. Transfer of the coal is handled by three men—one empty dropper, one ramp man and one load dropper. Switching from the ramp to the Friar Tuck preparation plant is done by the Milwaukee.

Rated shovel voltage at Robin Hood No. 3 is nominally 4,000. The step-down from 33,000 is handled by three 333-kva. transformers. A main pole line (1/0 wires) and laterals (No. 2 wires) 800 to 1,000 ft. apart conduct power to the pit. The stripping shovel is equipped with a 1,000-ft. Simplex cable—three 2/0 conductors with basket-weave shielding and a fourth 2/0 ground wire. This ground wire is connected to a rod driven



Switch houses for the loader and stripper cables at the end of a lateral pole line.

to moisture at the end of the lateral. The shovel also is grounded to the coal through the cats. The connection between cable and pole line is an oil switch equipped with current transformers and trip coils to protect against trouble in any phase as well as any overload beyond that required for starting up the shovel set. This breaker is backed up by a second oil switch at the main substation.

The cable on the loading shovel is made with No. 4 conductors. Otherwise its design, installation and protection are the same as the stripper cable.

Other pit equipment (pumps and drill) operate on 440 volts supplied by 15-kva. transformers. The circuits are protected by 15-amp. fuses on the high side of the transformers.

ARKANSAS CO-OP WASHERY

Cleans Minus 3-In. by Four Tables

Preparing 50 Tons Per Hour in Four Sizes

How small mine operators can compete with other fields in marketing small sizes is shown by a group of ten companies at Paris, Ark. A four-track all-steel cooperative washery prepares minus 3-in. by a battery of four diagonal-deck washing tables and two vibrating screens. Output is fancy nut, chestnut, stoker and carbon.

By CHARLES LAMBUR JR.
Assistant Editor, Coal Age

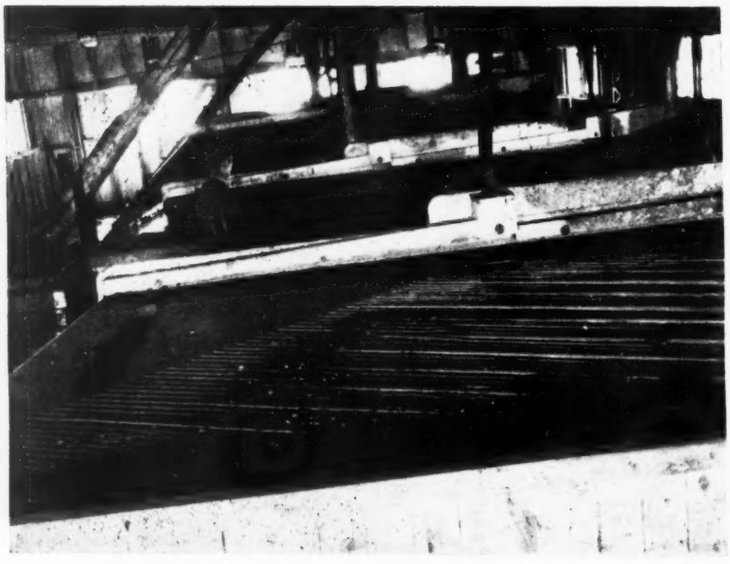
TO OFFER a clean product and meet discriminating market demands for a smokeless fuel, eleven Arkansas mines of ten companies prepare minus 3-in. at a cooperative plant, the Paris Coal Washery Co., Inc., Paris. A constantly increasing demand for stoker size made it imperative that rock and machine cuttings be removed to meet competition with other fields, so the non-profit organization was formed in May, 1938.

Construction of the washery began Aug. 15, 1940, on the Missouri Pacific Ry. at the abandoned Paris Purity Coal Co. No. 1 mine. It was in operation Dec. 2, and the capacity is 50 tons per hour. The plant is all-steel with a concrete floor supporting four diagonal-deck washing tables and was designed by the Deister Concentrator Co. and constructed by coal company employees. Original cost was $40,000.

Minus 3-in. is hauled to the washery by 50-ton railroad hopper cars and becomes property of the washery company as it leaves the mine. The cars dump into a 25-ton concrete hopper emptied at 50 tons per hour by a reciprocating feeder onto a 24-in. 125-ft. belt drag flight conveyor which feeds a 6-ton steel bin at the top of the washery. This bin discharges onto a Leahy 5x8-ft. double-deck vibrator which divides the feed into 3x2, 2x1, and 1x0-in. by Ludlow-Saylor double-crimped super-lay screens. Water is added at 100 g.p.m. and 40 to 50-lb.-per-square-inch pressure by five sets of sprays with six Concenco nozzles per set. Another 75 g.p.m. is added to the minus 1-in. sluice trough.

Table No. 1 cleans 3x2-in., which, after leaving the dewatering screen, is loaded by chute into railroad cars.

Plant feed is minus 3-in. and divided into 3x2, 2x1 and 1x10-in. by this double-deck vibrating screen. Washed minus 1-in. is sized to 1x3/16-in. stoker, on a similar single-deck unit.



Four diagonal-deck washing tables clean entire minus 3-in. four-size output.

All-steel four-truck preparation plant, the first complete washery in Arkansas.

The 2x1-in. is cleaned on table No. 2 and also is loaded by chute into railroad cars. Minus 1-in. is divided over tables Nos. 3 and 4 and their product passed over a 4x7-ft. single-deck vibrator screen making 1x$\frac{3}{8}$-in. stoker and minus $\frac{3}{8}$-in. carbon. Three sets of nozzles spray 100 g.p.m. at 60-lb.-per-square-inch pressure. Stoker is carried by a chain conveyor and loaded by chute into railway cars. Carbon passes into a steel 8,000-gal. settling tank and removed by a 6-ft. drag dewatering conveyor traveling 17 ft. per minute and loaded into cars. Refuse is disposed of by truck.

Water is supplied by a 50,000-gal. sludge pond and from abandoned mine workings, and is fed at 175 g.p.m. to table No. 1; 200 g.p.m. to table No. 2. and 100 g.p.m. to tables Nos. 3 and 4, which also receive the 175 g.p.m. from the primary vibrator classifying screen. All four tables are 8x16 ft. from Deister Concentrator Co. and operated by General Electric Type K 3-hp. 220-440 volt 1,200-r.p.m. motors with V-belt drive, to 275 r.p.m. They have Type CR7006-D40H magnetic switches and pushbutton control. Tables have a $\frac{3}{4}$-in. motion and Nos. 3 and 4 tables work best with $1\frac{1}{4}$-in. coal bed. Control is by adjusting the spray and table water supply.

New Units Scheduled

As in all new undertakings, changes are made as dictated by practical experience and in this plant will include a reciprocating feeder on the 6-ton feed bin, a centrifugal dryer for carbon, chain drag loading booms with degradation screens for fancy nut and chestnut, an oil-treating system and calcium-chloride treatment in the winter. Power is 220 volt a.c. from the Municipal Power & Light Co. Total plant horsepower is 100.

Total employees are four, consisting of a car dumper, table operator, car dropper, and loader and superintendent. Ash for the small sizes has been reduced by 60 per cent and washed stoker analysis percentage, as received, now averages: 4.4 moisture, 15.9 volatile matter, 67.9 fixed carbon, 2.0 sulphur, 9.8 ash and 13,470 B.t.u.

Officers are R. G. Johnson, president; George Minmier, vice-president; and F. K. Wood, secretary-treasurer. Cooperating coal companies are: Carbon Coal Co., Dixie Fuel Co., Dixie Two Coal Co., Mack Coal Co., New Eureka Mining Co., New Shockley Coal Co., New Superfuel Coal Co., New Union Coal Co., Paris Purity Coal Co., and the Victor Coal Co.

HOCKING DISTRICT MINE

Expands With Twin-Engine Power

And Erects Modern Plant for Truck Sales

EXPANSION and modernization completed late in October, 1940, at the White Brothers Coal Co. 200-ton-per-day truck mine in Hocking County, Ohio, includes a new twin-engined diesel generating plant, locomotive haulage, and a complete tipple with elevating conveyor, vibrating main screen, picking tables and adjustable boom for depositing lump gently into the bin. These improvements were made after several years of operation beginning in a small way with five mine cars, a mining machine and a gasoline-engine power plant.

This mine, one-quarter mile off State Route No. 56, southeast of Logan and 14 miles west of Athens, is a drift at valley floor elevation in the Hocking No. 6 seam, averaging 5 ft. in thickness. Under lease is an 84-acre virgin block of coal and adjoining is a larger acreage that is available. Originally the mine was operated by the W. W. & B. Coal Co., but early last year the two White brothers, Earl and Reno, bought out the third partner.

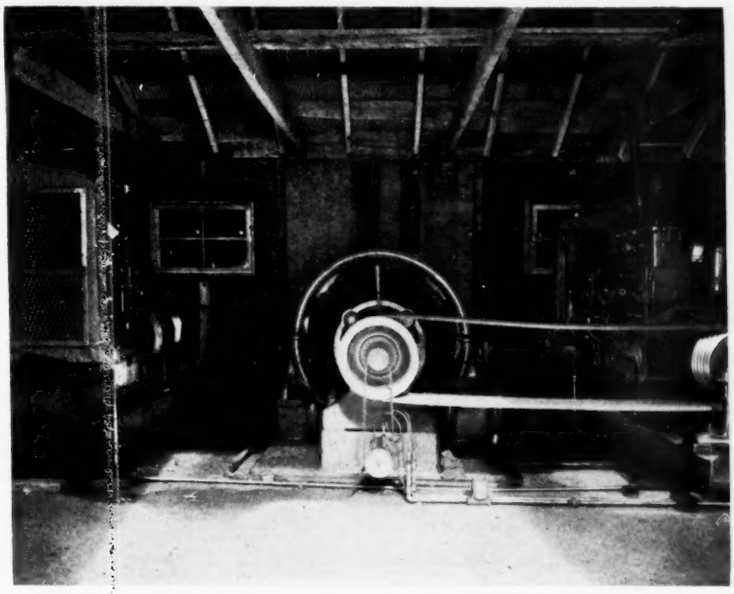
The company's first venture with strictly new equipment was in 1936, when it purchased a new 60-hp. International gasoline engine direct connected to a Westinghouse 40-kw. 250-volt d.c. generator. That unit effected savings in maintenance and attendance labor which paid for itself during the first year as compared to the typical operating expense of an alternative with which the company was tempted, an engine from a heavy-type passenger automobile.

As successor to the 1936 power plant the company now has two new Cummings Type H.I. 600 6-cylinder diesel engines each rated 75-hp., operating at 1,150 r.p.m. and driving an Allis-Chalmers 100-kw. 250-volt d.c. generator through Gates Vulco V-belts. Engines include "Twin Disc" clutches so that either one can drive the generator and the other remain idle or both engines can be used at one time.

There are pulleys on the two ends of the generator shaft and the engines are set on each side of the generator but in 180-deg. reversed positions with respect to each other. To hold maintenance to a minimum the shafts of the engine pulleys are mounted in ball bearings (SKF). This is an important feature inasmuch as all belts and pulleys operate continuously when the generator is in use even though one engine is shut down. Six 1¼-in. V-belts constitute each drive.

Fuel oil stored underground near the power-plant building is pumped into a 30-gal. domestic-hot-water-type feed tank in the engine room and equipped with high-level gage glass. The pump is driven from the end of the generator shaft and by reason of a continuous overflow system it keeps the oil level constant in the tank. From this tank gravity feeds the oil to the low-pressure fuel-distributor pumps of each engine. Fuel charges for all cylinders of an engine are metered by one individual single-plunger pump, then distributed to the cylinder injector nozzles by a revolving disk.

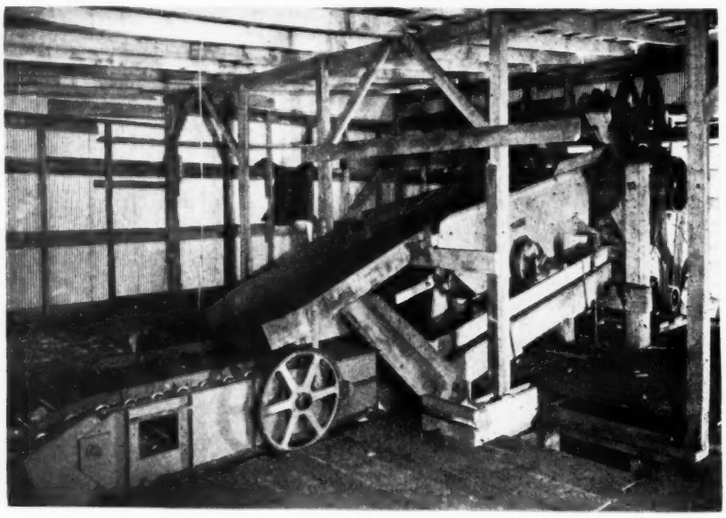
According to Reno White, the power-plant operating cost is "about $1 per day of approximately 8 hours." That cost is for operating one engine at a time, which he states furnishes ample power to operate one cutter, one haulage locomotive, one pump and the tipple.



Two high-speed diesel engines drive the 100-kw. d.c. generator.

New plant of White Brothers Coal Co. Building at left houses power units.

Drift mouth, car dump and conveyor which elevates from dump hopper to tipple.



Coal is sized on a vibrating screen and the lump conveyed and lowered to the bin by a combination picking table and boom.

In contrast to the original tipple, where the cars were hoisted up an incline trestle for dumping to a bar screen above loading bins, dumping for the new tipple is done at mine-track level. From the car-dump hopper the coal is delivered by reciprocating feeder to a 36-in. x 60-ft. (center-to-center) flight conveyor elevating at an angle of 45 deg. from horizontal and discharging to the main screen.

This screening unit is a 3x8-ft. four-deck vibrator having its drive shaft mounted in ball bearing (also SKF). Sizes made by the vibrator are 4-in. lump, 4x2-in. egg, 2x1¼-in. nut, 1¼x⅝-in. stoker and ⅝x0-in. slack. The tipple includes a truck loading bin of 40 tons capacity for each size. From the vibrator top deck the 4-in. lump is carried by a 24-in. apron conveyor having a 6-ft. horizontal picking section and a 21-ft. hinged boom section to lower the lump to the existing coal level in the bin. These items of tipple machinery were purchased from the following: feeder, Wade Electric & Manufacturing Co., Glouster; vibrating screen, Bonded Scale Co., Columbus; and conveyors, Morrow Manufacturing Co., Wellston. Motors of the feeder, conveyor and tipple are connected to the machines by Gates Vulco V-belts.

Haul With 3-Ton Motor

For haulage the White Brothers purchased a rebuilt Westinghouse 3-ton trolley locomotive without cable reel. Mine-track gage is 39 in. and the main-line rails are 30-lb. The present haul is 1,200 ft. with 2 per cent grade against the loads. Twenty-five plain-bearing wood cars carrying 3,200 lb. complete the haulage equipment.

A temporary car incline, automobile-engine car hoist, bar screen and truck loading bin erected back of the site of the new tipple to serve during construction has been maintained in place and from it three sizes can be loaded: mine-run, 2-in. slack and 2-in. lump. Since the code minimum prices went into effect this temporary tipple has found considerable use because the code minimum of $2.50 on egg coal is so high that it does not sell as readily as other sizes. When its bin gets full the whole tipple must stop. Some of the customers then turn to mine-run or to one of the two other sizes available at the temporary structure. When there is call for treated stoker coal the dust-allaying liquid is applied by a manually operated pressure spray pump as the coal is being loaded into the customer's truck. All sales are cash-and-carry transactions.

ACCURATE RECORDS

For Each Mechanized Unit Vital In Checking Mechanical Mining Efficiency*

By ARTHUR C. GREEN

Vice President
Goodman Manufacturing Co.

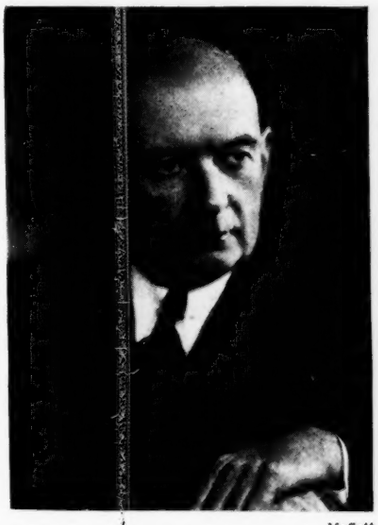
AS MECHANICAL mining comes more and more to the front, the importance of accurate records of just what is taking place on each mechanized unit is rapidly being recognized. In well-systematized mines using track loading and cutting equipment, where grades are essentially level, the actual time required to pull a load away from a loader and put an empty back in its place now runs from 18 to 20 seconds.

Let us consider an actual mine in which cars level full hold 5.8 tons of coal and, to be conservative, assume these cars are not loaded higher than level full, which actually is not the case. In this mine, with coal averaging 6 ft. in height, rooms 24 ft. wide and entries 12 ft. wide under extremely bad top which requires heavy timbering, the management has devised what it terms an efficiency method of rating its loaders.

The time consumed in loading the car, actually pulling away the load and putting back in its place an empty is considered effective loading time. Other allocations of the total shift time are: moving time for the loader, time waiting for cars when no cars are available, time lost in wrecks and derailments, power-trouble time loss, cable-trouble time loss, machine-repair time loss and miscellaneous delays.

Table I is a representative record of one loader's performance for a three-month period. During that period, the machine worked 52 days and loaded 5,790 cars. The efficiency figure—percentage of loading and car-changing time—was 84.31 per cent; average loading and car-changing time per car, 3.18 minutes. Management is striving to reach 90 per cent efficiency. Average tons per loader per shift, based on 5.8 tons per day during this period, was 645.

Efficiency over the three-month period varied from 81.89 to 88.24 per cent. As moving time in percentage goes up the efficiency goes down. The remedy is self-evident. In the month in which efficiency was lowest (81.89 per cent) lost time due to waiting on cars was higher than in either other month. A detailed delay report covering the 14-day period of this particular loader is shown in Table II.



Moffett

Arthur C. Green

It will be noted that 72.65 per cent of the total lost time was lost in waiting for cars.

Room panels at this particular mine consist of 42 rooms, 21 on each side (Fig. 1). Forty-five switches are required to work out the entire panel. Forty-pound rail is used in the rooms and 60-lb. on the entries. All switches and rail length are standardized. Preformed curved rails also are standardized and kept in stock. Steel ties are used. There is never any delay in getting standardized material needed for track extension from the warehouse. Track cost, including labor and material, is slightly over 6½c. a ton. This mine is essentially level.

Each loader is served by one gathering motor. Two loaders, therefore, would have two gathering locomotives, which in turn are served by one swing motor, delivering the loaded cars onto the parting.

Use of a 10-ton car would still further increase the efficiency factor and the tons per loader per shift. Car-change time would be reduced and, with fewer cars needed, time lost in waiting for cars would be materially reduced. In this particular mine, where a room fall will throw about 40 tons of coal, only four cars would be required to clean up a place. If one car follows the loader into the place, no time will be lost in car change or in waiting for the first car. There will be a car-change time loss between car No. 1 and car No. 2, between car No. 2 and car No. 3, and between car No. 3 and car No. 4. If each car-change time is 20 seconds, one minute would be lost in car changes to load out the 40 tons. Seven cars of 5.8-ton capacity would be required, and six car-change losses

* Abstract of an address, entitled "Track Loaders," delivered before the 39th regular meeting of the Rocky Mountain Coal Mining Institute, Denver, Colo., June 27, 1941.

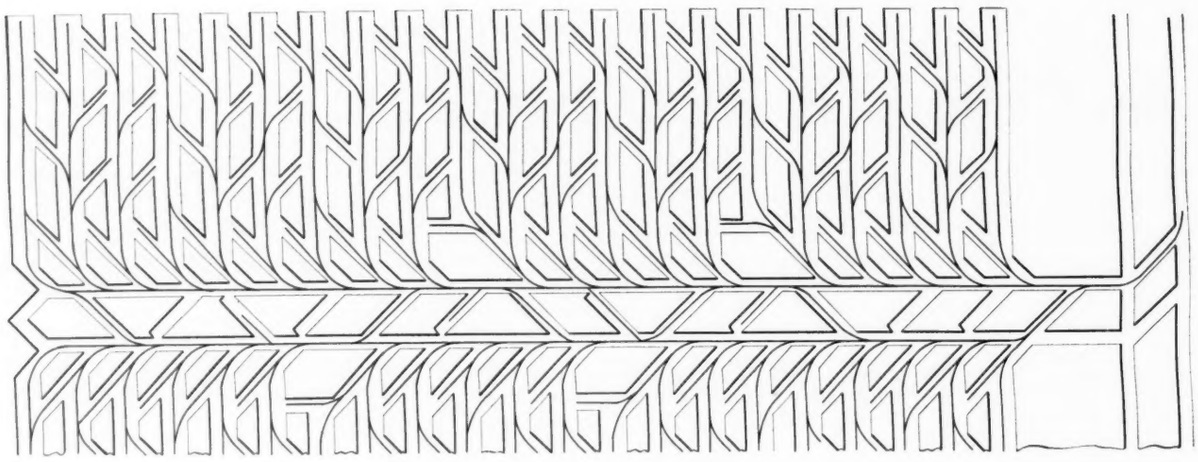


Fig. 1—Each panel has 21 rooms on a side.

would occur, or double the car-change losses with 10-ton cars.

In mines where it isn't possible to hoist a large car or equip the shafts with skips, a transfer system can be applied which will give the lowest cost the mine is capable of making. This system is based upon the use of 10- or 12-ton-capacity drop-bottom cars to transfer the coal from the loading machine at the face to a central transfer station. This station is located on the cross-entry, usually half way between panel entries. It is possible, therefore, for four loading machines working in four separate panels to deliver coal to this loading transfer station.

The transfer station consists first of two parallel flight conveyors which lie on either the entry floor or in a depressed portion of the entry floor. A ramp is built over the conveyors, where the conveyors are on the entry floor, and necessary top clearance is obtained by shooting the roof. The drop-bottom cars run over the ramp and drop their coal onto the chain conveyors. At the end of these horizontal conveyors the coal is discharged onto two similar chain-flight conveyors which elevate the coal through the crosscut to a common discharge point on the back entry. Here the small-capacity mine cars are pulled past the discharge point by either a locomotive or hoist, and are loaded in one continuous string. One man at the discharge point controls the operation of all conveyors. Tremendous tonnages can be handled before it becomes necessary to move the station to another location.

Table I—Loading Equipment Performance

Month	Cars Loaded Number	Moving Time	Out of Cars	Drlmnts.	Power Trouble	Cable Trouble	Machine Repairs	Misc.	Loading and Changing	Avg. Loading and Changing Per Car Minutes
		Per Cent of Total Shift Time								
17 days worked	1870	7.52	4.52	.41	.10	.74	3.99	....	82.72	3.16
14 days worked	1574	8.16	7.23	.35	.31	.26	.95	.85	81.89	3.06
21 days worked	2346	6.81	2.59	.23	.34	.80	.71	.28	88.24	3.28
	5790	7.41	4.47	.32	.25	.64	2.26	.34	84.31	3.18
	Total	Avg.	Avg.	Avg.	Avg.	Avg.	Avg.	Avg.	Avg.	Avg.

Table II—Where Lost Time Went

Name of Company
Name of Mine

Delay Report — Month of _____ 19__

_____ Foreman

No. Cars Loaded, 1,574
Avg. Per Day, 112.43
Avg. Tons Per Day, 652

Date	No. of Cars Loaded	No. Cars	Wrecks and Drlments.	Power Trouble	Cable Trouble	Machine Repairs	Misc.	Total Lost Time
		Minutes per Shift						
5-2	113	10	....	....	....	....	....	10
3	111	5	....	....	....	56	....	61
8	116	35	....	8	10	....	....	53
9	121	11	....	5	....	....	....	16
10	119	20	....	5	....	....	....	35
15	102	58	....	....	....	....	15	73
16	89	110	....	....	....	....	....	110
21	98	50	....	....	....	....	25	75
22	115	20	10	....	....	....	10	40
23	123	15	....	....	....	....	....	15
27	109	45	....	....	5	....	....	50
28	127	4	11	....	....	....	....	15
29	117	17	....	....	....	....	....	17
31	116	15	....	....	....	....	....	15
Total	1574	425	21	18	15	56	50	585
Per cent of Total Lost Time	....	72.65	3.59	3.08	2.56	9.57	8.55	100.00

Load Out in 26 Minutes

If we assume that we wish in this mine equipped with small mine cars to average no better than the operation is averaging in which the 5.8-ton cars are in use, or 645 tons a shift, and if we assume that we are using the 10-ton transfer car, 65 cars would be needed. If each room will throw four cars, a fraction over 16 places would need to be loaded out per shift, or 2.32 rooms per hour. This would mean, including delays, that the room would have to be loaded out in about 26 minutes.

Allowing three minutes for dumping and three minutes for uncoupling and coupling up at the loading end of the room, or six minutes altogether, the locomotives would have 20 minutes in which to make a round trip. If, considering acceleration and deceleration, we assume that the swing motor travels at an average speed of three miles an hour, or 264 ft. a minute, the round trip distance in 20 minutes would be a mile, which means that the transfer station would be half a mile from the most distant parting in the panel.

WHEN CAUSES OF COAL WANTS

Are Determined, Their Direction Can Be Prognosticated With Some Certainty

Whenever coal is lost in any other way than by faulting, the area is said to be a "want." Wants may be caused by streams that have washed away the coal, by almost horizontal pressures that have pushed it out of place, or by earthquakes that have dislodged it. If the type of want is known, it becomes less difficult to form an estimate of the extent and direction of the disturbed area.

By A. NELSON
Mining Engineer
Ammanford, Wales

FOLDING and faulting systems in the British coal fields are fairly well mapped, and the difficulties they create can be met with comparative ease by cross-measure tunnels. It is difficult to discriminate, however, between washouts and other wants, and in many instances their actual structure and mode of origin are obscure. These barren and jumbled coal belts are serious obstacles to mine planning and continuity of output.

Although wants appear haphazard, closer examination reveals that definite circumstances govern their occurrence. As their apparent complexities are better appraised, a more precise understanding of each type is possible and a reasonably correct deduction may be drawn, even though the significance of all the complex secondary features present may not be fully appreciated.

The erratic features of each of these wants are intimately correlated to the original agencies which formed them, and a close study of these is essential to a diagnosis. In this contribution, some original notes are given on the structure, lithology and the probable origin of the various types of wants. From underground evidence it appears that these coal-measure abnormalities can be classified—according to their mode of origin—as follows:

1. Contemporaneous disturbances, with water erosion as primary cause.
2. Pressure belts, produced by side pressures at low inclinations.
3. Tremor tracts, in which earthquakes appear to have been the initiating agencies.

Fig. 1 is a section across a portion of a typical washout. A lithological feature which almost always is associated with such a disturbance is the downward descent of sandstone which displaces the normal roof. The washout structure discloses flow phenomena, pseudo-unconformities, split and splayed seams and lenticular sandstone intrusions. Along its fringe, there normally is a gradual transition in the roof material. On approaching one of these erosion channels, the roof, if normally shale, becomes more sandy. If the seam has partings, thin sheets of sandstone may appear along these channels, which become thicker and more persistent as the washout is reached.

These erosional features of an old river system are presumptive evidence of channelling which interrupted the tranquil formation of the seam and the normal cyclical order of deposition of the super-imposed strata. The water cut a path across the delta-like surfaces of the coal-measure swamp, and sandy sediment filled up the river courses. The washout stream abraded the vegetal deposit with comparative ease but the action was retarded as soon as the harder floor was reached. Thereafter, lateral expansion provided for the continued accommodation of the stream. Therefore, fireclay floor usually persists throughout the width of the erosion channel, and this provides a reliable guide in driving exploratory headings.

The sandstone roof has no regular stratification planes. What lamination there is undulates with the rolling masses of sandstone. These sandstone deposits contain streaks of coal which taper down and interlace in minute threads. Such wisps of coal usually demarcate the principal rolling lamination planes in the sandstone and often join laterally, like a chain, thicker masses or beds of coal.

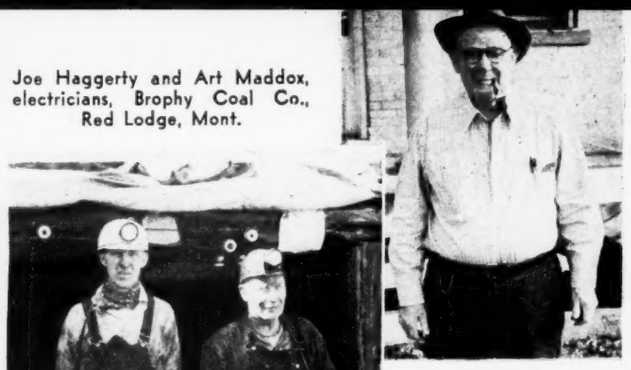
This probably arose from parts of the vegetal matter becoming dislodged from the parent bed, carried downstream and redeposited in the sandy sediment to form coal veins and "floats" along the fringe of the erosion belt. These layers of coal often terminate in splayed edges giving the characteristics "fishtail" phenomena. The marked difference in weight and compressibility of the sand and vegetal material would induce unbalanced loading, causing local subsidence, slides and step faults in the material.

Presence of shales and mudstones over a coal seam normally connotes uniform and tranquil sedimentation conditions. In a washout zone, such fine shales are significantly absent, and the alien sandstones often extend upward for 90 ft. and more. In view of all the evidence, such erratics can be reliably attributed to erosional agencies.

Pressure-belt disturbances are likely

"ON THE JOB" WITH COAL MEN ACROSS THE LAND

Underground at Brophy Coal Co. mine, Red Lodge, Mont., with James R. Brophy, owner and manager, second from left, and Walter Sandine, foreman, right.



Joe Haggerty and Art Maddox, electricians, Brophy Coal Co., Red Lodge, Mont.

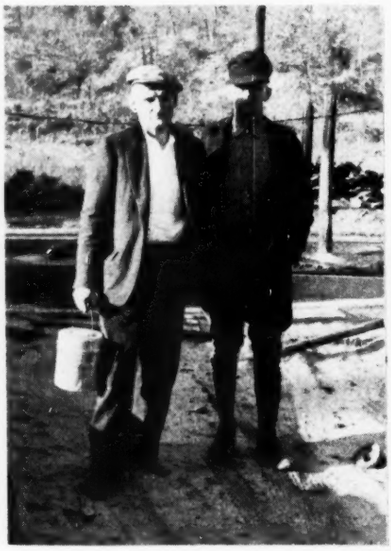
J. S. Bowie, general manager, Juanita Coal & Coke Co., Bowie, Colo.

Thomas Morgan, foreman, and G. E. Gildroy, president, Bair-Collins Co., Roundup, Mont.

Part of top force at new Washington mine, Clayton Coal Co., Erie, Colo., including R. W. Young, top boss; Sam Sidle, master mechanic; Robert Johnson, mine foreman, and R. W. Burt, hoisting engineer.

Guy Savio, foreman; J. L. McBrayer, superintendent, and Archie Allison, outside foreman, Colorado Fuel & Iron Corporation, Farr, Colo.

Arvo Macki, welder; Alfred Strangfeld, chief electrician; James H. Arnott, master mechanic, and H. D. Pinkney, superintendent, Crested Butte (Colo.) mine, Colorado Fuel & Iron Corporation.



Ned Wilson, superintendent, and Bob Lewis, top boss, Ben-Hur Coal Co., Henryetta, Okla.

M. W. Padfield, outside foreman, State mine, and William Andrew, general superintendent, Boulder Valley Coal Co., Erie, Colo.

F. R. Blount, Jr., Consumers Lignite Co., Alba, Texas

A. P. French, superintendent; Lawrence Vickers, master mechanic; E. A. Cocetti, machinist; Julius Goemmer, electrician, and George Eadie, night foreman, Calumet No. 2 mine, Calumet Fuel Co., Delcarbon, Colo.

SNAPPED BY COAL AGE ROVING EDITORS AT THE MINES

R. H. Houck, master mechanic and central shop foreman, Hume-Sinclair Coal Mining Co., Hume, Mo.

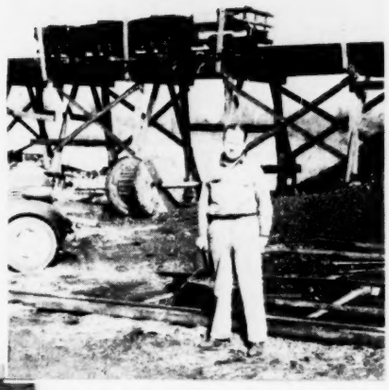
Orrville A. Runkle, preparation manager, Pittsburg & Midway Coal Mining Co., West Mineral, Kan.

Gene Taylor, vice president, Ben-Hur Coal Co., Henryetta, Okla.

Stanley Knox (left), foreman, Chinook preparation plant, Ayrshire Patoka Collieries Corporation, Staunton, Ind., with the night maintenance men.

G. W. Reitz, general foreman, Jewel Mining Co., Paris, Ark.

John Sidle, general superintendent, and T. W. Miller, night foreman, Washington mine, Clayton Coal Co., Erie, Colo.



Degen Boyd, vice president, Boyd Excelsior Fuel Co., Greenwood, Ark.

D. A. Kerr, superintendent, with Gerald Thorne and Albert Kisner, foremen, Industrial mine, Rocky Mountain Fuel Co., Superior, Colo.

Clayton Powell, chief electrician; Claude Littlejohn, outside foreman, and Keith McAfee, master mechanic, Centennial mine, Boulder Valley Coal Co., Louisville, Colo.

H. L. Swihart, superintendent; W. J. Scnabel, coal inspector; George Page, master mechanic; Frank Salisbury, track foreman; D. W. Kerr, mine foreman; George Sirokman, tipple foreman, and George Swallow, assistant mine foreman, Columbine mine, Rocky Mountain Fuel Co.

M. M. Gates, first-shift engineer; Ben Benham, chief electrician and master mechanic; George Watson, president; E. C. Shipley, foreman, and Pete Dalla Batta, shift leader, Domestic Coal Co., Axial, Colo.

to be erroneously grouped with true erosion channels. There is little doubt, however, that erosion has no part in their formation. Fig. 2 is a diagrammatic section across a pressure-belt disturbance which has affected two seams 33 ft. apart. The floor of the seam is generally normal and undisturbed, as in washouts.

The coal has been thinned or completely displaced by a gradual downward movement of the roof *en masse*, though throughout the disturbed belt the normal sedimentation cycle remains practically intact. It is fairly conclusive that these disturbances were produced by steady and unremitting forces acting at easy inclinations. In origin, these pressure belts are comparable to rock slides or thrust planes. It is evident that the coal and under-rock sheets showed an unequal resistance to stress.

The approximate trend of these disturbances coincides with the normal faulting system of the region, with the stresses acting along the line of strike. The affected area, when the outline has been proved, is found roughly lenticular in shape. A characteristic feature of the true pressure belt is a very thick coal deposit running along the fringe remote from the direction of originating forces. This belt of crushed and piled-up coal may be from five to ten times the normal section of the coal seam.

Structural evidence tends to show this thick coal was formed by the slippage and flowage of the organic material originally deposited along the barren belt. The coaly mass has been heaved and imposed on top of the normal section. Generally, the disturbance is confined to one seam and does not extend or influence the continuity of the upper seams.

Fig. 3 is a view of part of a disturbance that probably was caused by earth tremors. This type of want generally is regional, with some seams more affected than others. These forces—causing a wholesale fracturing and shattering of seam giving rise to complex structures and trending in all sorts of erratic directions—are mainly concentrated in the coal seam and associated carbonaceous shales. The coal is badly jumbled with haphazard flexures, step faults and overthrusts.

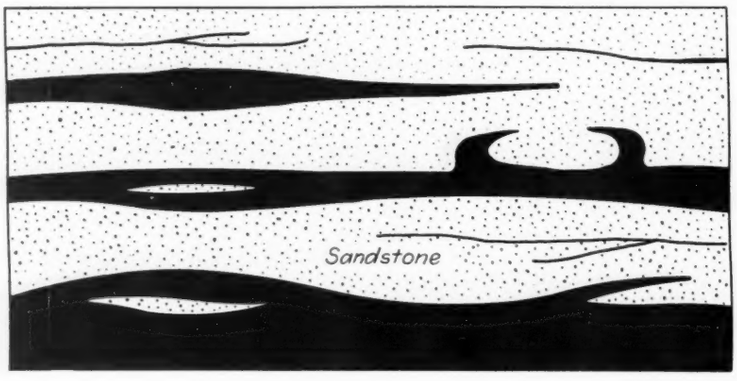


Fig. 1—Typical erosional want.

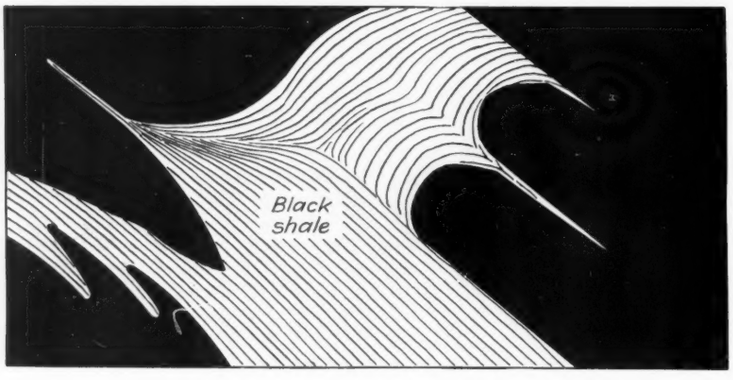


Fig. 2—A want resulting from side pressure.

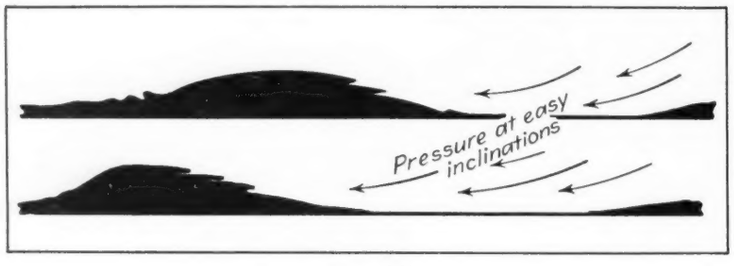


Fig. 3—Earthquake responsible for this distortion.

When the Earth Trembled

Earthquake activity during, or soon after, the deposition of the coal seam probably fractured and weakened the partly indurated coal deposit. Subsequently, lateral forces caused the deposit to lurch and heave, resulting in a complicated jumble of coal and associated shales. Since the vegetable laminas and soft shales have a low bending power, fault folds and step overthrusts were produced along the fractures already induced by the seismic activities.

These lateral forces, active over considerable periods, caused the fractured deposit of coal to be pressed, rolled and flowed over and upward into the accommodating soft shales above. The fireclay floor is rarely affected, although it may gently undulate with the rolls in the coal seam. From the flexures and step faults in the coal it is often easy to determine the direction of the initiating forces, and this information is of value in determining the best direction to drive exploring headings. The partings in the jumbled masses of coal and shales are smooth and polished, indicating slippage and relative movement.

Diligent study of these complex coal-seam erratics has a definite scientific and economic value. The ability to diagnose a disturbance of this nature is obviously the primary step in forecasting its extent and trend. A rational approach along these lines will assist in developing the area with minimum of cost and dislocation to mining operations.

EFFICIENT BARRIER RECOVERY

Accomplished at Industrial Mine

By Using Loading Machine and Shuttle Cars

One loading machine and two shuttle cars make possible an output of 13 tons per man employed underground at Industrial mine, where the entire output of 640 to 650 tons comes from barrier recovery under difficult conditions. Three to five working places supply the tonnage under a three-shift working schedule. Carbon dioxide is used to break down the coal.

WITH entire output coming from barrier pillars, one loading machine and two shuttle cars produce 640 to 650 tons per day of three 7-hour shifts at the Industrial mine of the Rocky Mountain Fuel Co., Superior, Colo. Conditions, as might be expected when working between old gobs on each side, are none too favorable, including, as they do, weight, bad top, and heaving bottom. Nonetheless, output per man-shift underground averages nearly 13 tons, and the life of the mine has been substantially extended; this because mechanical operation assures a low cost, whereas barrier recovery by hand-loading would have been difficult and practically out of the question from the cost standpoint. Eventually, the mechanical-mining equipment will be used to extract the remaining virgin coal and thus bring to a close the mining history of the property, which began in 1892.

Industrial mine is the second in the Rocky Mountain Fuel Co. group to be mechanized under the direction of Coal Mine Management, Inc., headed by William Taylor, president, and Alex Grant, vice president. This organization took over the management of the coal company's properties in June, 1939, and immediately embarked on a program of consolidation, modernization, and mechanization designed to fit them to mine and prepare coal in accordance with all present-day standards. The first loading machines and shuttle cars went into Columbine mine, Serene, Colo., in August, 1939, and now are engaged in the same type of work as at Industrial until other modernization activities and preparations to open up a new acreage of coal reach the proper stage.

Mechanical mining started at Industrial on Oct. 21, 1940, and is supplemented by safety hats, safety shoes, and Portable Lamp & Equipment Co. electric cap lamps. Hand-loading was the previous practice, although experiments with shaker conveyors had been conducted at one time. Just before the change over, average output per man-shift worked underground was around 3 to 4 tons, compared with the present average of nearly 13 tons in barrier work.

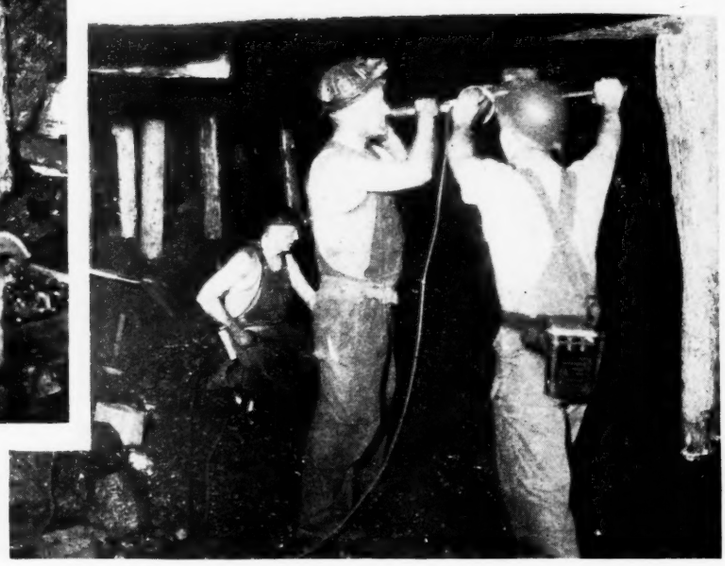
Access to the Industrial workings is by a shaft accommodating cars holding slightly over 1 ton mechanically loaded (about 1½ tons during the hand-loading era). One step in revamping the operation was the installation of an electric hoist (moved from the company's Grant mine) to permit a change from part generated to complete purchased power, with a material saving due to closing down of the old hand-fired boiler plant. The seam is the Laramie, which is the source of most of the sub-bituminous coal (locally termed "lignite") produced in the Denver basin. Mining thickness at Industrial is about 7 ft., which excludes about a foot of inferior "gray coal" left in the top and another foot under the undercut, which is made just over a dirt band. A second band (about 4 in. of slate) occurs about 2 ft. higher and is removed by hand picking.

The cover over the present working section is around 400 ft. and is mainly soft stuff down to and including the shale resting on the coal. This shale naturally is weak and in addition is broken and full of slips. Consequently, much timber is required, particularly in pillar workings and entries which must be kept open some length of time. Underneath the coal is soft fireclay, which tends to heave when weight comes on. Some corduroying to permit shuttle-car operation is necessary and sprinkling is carefully controlled to prevent formation of pools or wet spots, with consequent destruction of the runway.

Production equipment consists of one Joy 7BU loading machine, two 5-ton Joy shuttle cars (350-amp.-hr. Gould batteries), one Joy elevating conveyor for transferring the coal to mine cars, one Goodman universal shortwall with 7-ft. bar, and one Black & Decker hand-held coal drill (Hardsocg conveyor-type augers, Coalmaster heads and bits), plus a charging station, extra set of batteries for each car, 6- and 8-ton Jeffrey trolley locomotives for handling 15-car trips on the main line and at the transfer station, etc.

Crew make-up is as follows:

Face boss	1
Cutters	2
Drillers	2
Shotfirer—also bugdusts	1
Timberman	1
Loader operator and helper	2



Above—Cutting an open-end place on a pillar. In the foreground is the caterpillar shortwall truck.

Upper right—Two men drill while the shotfirer bugdusts the cut.

Middle right—Here the shotfirer places a carbon-dioxide tube.

Left—Loading machine at work in one of the infrequent solid places driven to split up a barrier pillar.

Bottom left—Shuttle car getting a 5-ton load.

Below—Mine-car loading station and elevating conveyor.

Shuttle-car operators	2
Elevator operator—trims cars	1
Blocker—assists in spotting cars	1
Mechanic	1
Total	14

Coal is hoisted on two shifts, which means that the third-shift output is stored in cars. When hoisting is done, two cagers work. These men, plus main-line motormen, general maintenance men, and other underground employees, bring the total per day (600 to 650 tons of coal) to 50 to 55. Mine operation is directed by D. A. Kerr, superintendent, assisted by Alvin Kisner, section boss. George Page is chief electrician and master mechanic.

Load From 3 to 5 Places

The Industrial output is derived from three to five working places on a 45-deg. pillar line taking in the barriers on both sides of an entry and also the chain pillars, plus occasional room stumps or other pillars left outside the barrier lines in the past, provided they are not too difficult to get at. Progress to the time this article was prepared is indicated in Fig. 1, which also shows the working plan and the shuttle-car routes. Solid work is limited to just sufficient openings 14 to 16 ft. wide to split the barriers, where necessary, into blocks 35 to 50 ft. through. Where openings already were present, it sometimes is necessary to skip one rib or the other, either because conditions are too bad in the original opening to permit reentry or because it is too narrow for shuttle-car operation. On the lower side (Fig. 1), the shuttle cars might be said to haul direct. On the upper, to put the work on the side opposite the gob, the cars cross over the entry, go up the solid pillar, across the end, and down the pillar being mined to the working place.

Pillars are recovered by open-ending, in which process successive cuts 16 to 20 ft. long are made across the end next to the gob, as shown diagrammatically in Fig. 1.

The usual working cycle in a place is timber, cut, bugdust and drill, load holes, fire, inspect and set auxiliary timber if required, and then load coal, putting in additional timber if necessary. The bottom and ribs in all working places are sprinkled regularly, particularly just before coal-loading begins. Coal-breaking is done with Cardox 2-100 tubes for easier loading and a higher yield of better-quality lump. Tubes (No. 11 heaters, No. 10 disks) ordinarily are loaded with 3 lb. of carbon dioxide. A 14- to 16-ft.-wide solid work place normally is broken with five holes (Fig. 2), two just above the band and three in the top, all drilled practically level and straight in. Four to five holes (all in the top about as shown in Fig. 2) are used to break 16- to 20-ft.-wide open-end places making 35 to 40 tons of coal.

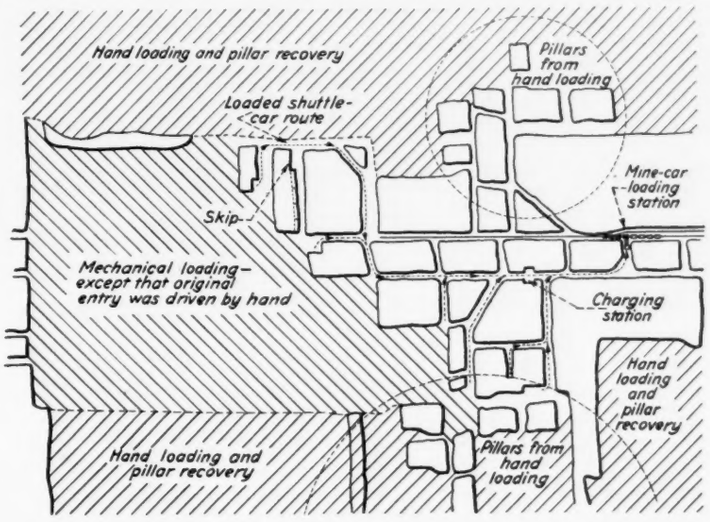
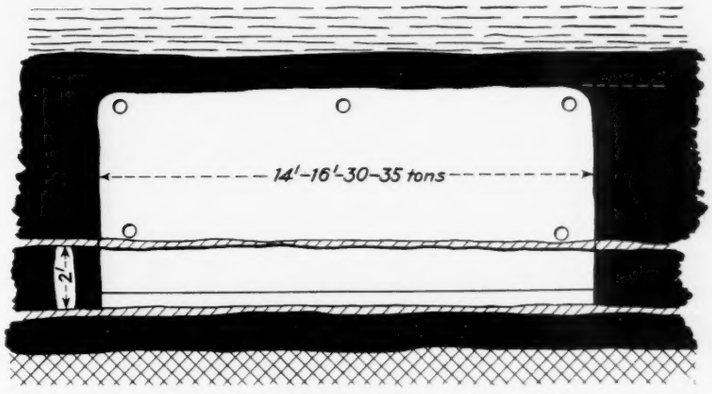


Fig. 1—General plan of barrier recovery with loaders and shuttle cars, showing progress to date.



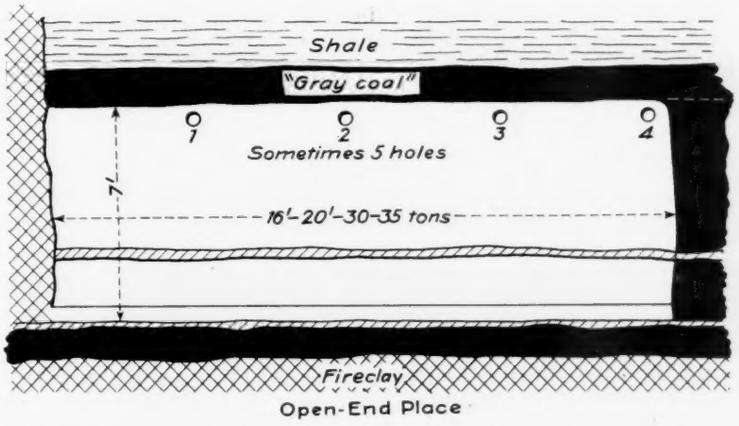


Fig. 2—Drilling patterns for carbon-dioxide coal-breaking at Industrial mine.

FLUID BRAKES

On Monitor Retarding Machines

Cut Cost and Increase Safety at Bergoo Mines

SOLUTION of the problem of lowering coal monitors and men and supply cars down long inclines with safety and at minimum costs for brake renewals and maintenance at Pardee & Curtin Lumber Co. mines near Webster Springs, W. Va., includes two installations of fluid brakes. A third mine, however, uses electric regenerative braking with full automatic control.

The larger of the two Hydromatic, or fluid, brakes is 36 in. and is installed at No. 4 mine to control two coal monitors which operate in balance over an incline 2,175 ft. long and with a minimum grade of 32 per cent, a maximum of 50, and an average of 40 per cent. Without mechanical wear, shocks or jars this unit (Fig. 1) brakes and controls the speeds of 10-ton loads of coal traveling at 1,200 f.p.m.

Resistance by fluid friction between the inner surfaces of an inclosed housing is the principle of operation. Use of this brake represents a new application of a device pioneered by the Parkersburg Rig & Reel Co. for controlling the sand reels and bull wheels employed in the oil industry. Unlike the typical oil industry unit, which has a retarding action in one direction only, this job for the monitors operating in balance has a special internal design which develops equal resistance for both directions of rotation.

Braking capacity increases as the square of the speed, a characteristic which works to advantage in limiting speed. If desired, an adjustable resistance control can be applied by varying the head of water in a supply tank or valving the water circulation between the brake rotor and the tank. Variable resistance, however, is not necessary on this No. 4 installation.

Total weight of a monitor and its load is 16.5 tons. Maximum pull of the rope (1¼-in.) is 15,270 lb. and the net torque developed at the periphery of the 10-ft. drums is 8,000 lb.; thus the maximum braking required at 1,200-f.p.m. rope speed is 291 hp. Rating of the 36-in. brake is 300 hp. maximum at 180 r.p.m. The drive is a roller chain, 60 in. centers distance, connecting a small sprocket on the hydromatic shaft to a large sprocket on an extension to a drum shaft. Speed of the latter shaft is 38.2 r.p.m.; the drive ratio is 4.72 to 1; and the maximum chain pull is 20,700 lb.

Brake liquid—water, made antifreeze with calcium chloride and containing sodium dichromate and sodium hydroxide as corrosion inhibitors—is stored in a 500-gal. steel tank on top of which is mounted a cooling tower depending on natural-draft air circulation (Fig. 2).

On the other Hydromatic installation, governing hoist speed in lowering cars on the man-and-material hoist at Bergoo No. 3, a lever-operated valve (bottom center, Fig. 3) in the liquid line between brake and tank adjusts the degree of braking to suit the grades and loads. This hoist, winding a single rope and driven by a 150-hp. 2,300-volt General Electric wound-rotor motor, serves an incline 1,950 ft. long with grades averaging 45 per cent (Fig. 4). While supplying the braking for the down trip, its primary functions are to limit the lowering speed and to stand ready to take up the same job if during a hoist some failure should allow the car to run backward.

This brake is a Type A 10½-in. which develops resistance in only one direction and therefore need not be disconnected during hoisting. The drive connection is a roller chain from a Fawcus gear reducer. While hoisting heavy loads or handling man-trips the hoist operator adjusts the valve to maximum braking. To lower an empty car, when a higher speed is permissible, he adjusts the valve to less braking. A cooling tower and tank of 100-gal. capacity are installed in connection with this unit.

Regenerative braking was applied to the monitor retarding machine (Fig. 5) at Bergoo No. 2 in 1934 by installing a Westinghouse 200-hp. 440-volt motor. In 1940 the machine was revamped with larger drums, anti-friction bearings and a new gear reducer, all furnished by Link-Belt Co. Promise of longer rope life was the principal reason for changing to larger drums.

Instead of the usual drum control—a type with which an inexperienced operator can allow destructive overspeeds—control of this No. 2 monitor plane is automatic. The job is accomplished by Westinghouse contactor panels having relays interlocked with a flyball governor driven from a drum shaft. After the monitors have been started by the operator's releasing the mechanical brake and pushing the start button, he has no other control responsibility until making a landing.

Shorting out all resistance from the rotor circuit to secure maximum braking is done automatically when the motor has attained synchronous speed. At that point the flyball governor makes a contact that closes a control board contactor. The mechanical brake is set by a spring weight and is held in released position by a General Electric Thrustor. In case of overspeed the flyball governor opens a contact which sets the mechanical brake and cuts the motor from the line.

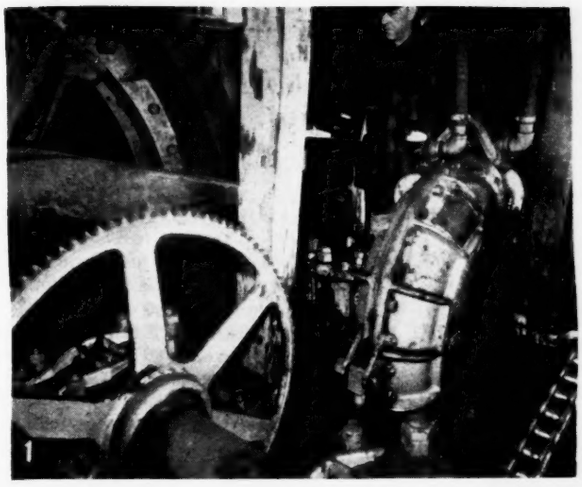


Fig. 1—This 36-in. fluid brake (right foreground) is connected by roller chain to the monitor incline machine at Bergoo No. 4 mine. E. P. Selby, superintendent, stands in the background.

Fig. 2—Brake liquid tank and a cooling tower on top of it at the headhouse of Bergoo No. 4 mine.

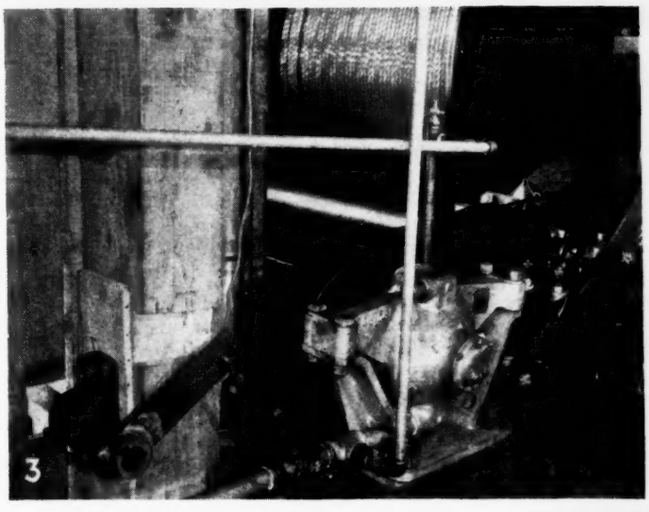


Fig. 3—This 10½-in. fluid brake with valve torque adjustment governs lowering speeds on the man-and-supply incline at Bergoo No. 3 mine.

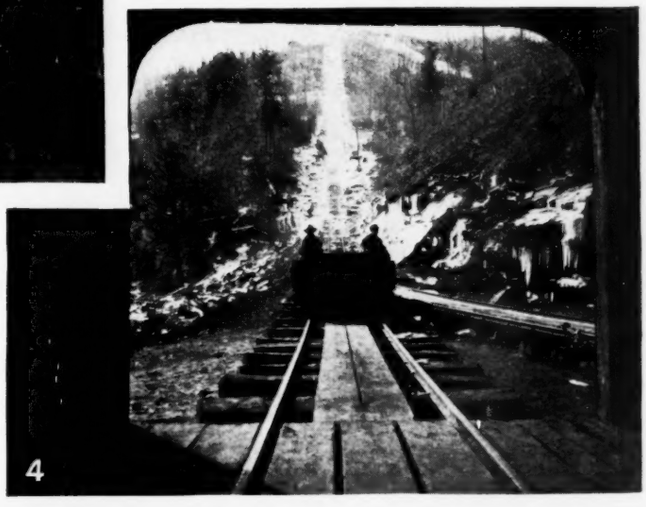


Fig. 4—Man car operated from fluid-braked hoist approaching the waiting-room terminal at Bergoo No. 3 mine.

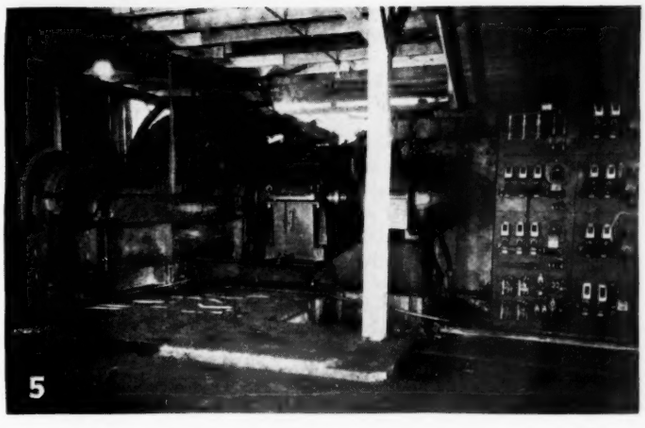


Fig. 5—Monitor retarding machine at Bergoo No. 2 mine with its 200-hp. motor and automatic control for regenerative braking.

FOREMEN'S QUESTION FORUM

Safe Travel in Shafts, Slopes and Planes—By What Methods Can It Be Assured?*

By THOMAS ALLEN
Chief Inspector of Coal Mines
Denver, Colo.

ELEVEN principles stand out as essentials for safe travel in shafts, slopes, planes and aerial tramways: (1) Embarkation points should be well lighted; (2) no exposed electric wire should be permitted where trips are loaded or unloaded; (3) men should be provided with waiting rooms; (4) machinery should be stopped when men are assembled, loading or unloading; (5) trips should not be run at high speed when men are assembling; (6) no tools or powder should be carried on man-trips, cages, buckets or skips; (7) loading and unloading always should be under supervision of a competent and reliable man; (8) openings to slopes and shafts should have gates or similar guards; (9) only enginemen of experience and thoroughly reliable should be employed; (10) vehicle or vehicles carrying men should travel at slow speed and be carefully handled; (11) riders should receive clearly stated instructions.

To accord with Colorado laws, the hoisting machinery and appliances on shafts and slopes must be approved by the chief deputy inspector of coal mines; the drum flanges must project 4 in. beyond the rope when it is all wound on the drum; adequate brakes, suitable indicators and a device to prevent overwinding must be provided, and three full laps of the rope still must remain on the drum when the cage is at the bottom.

The manufacturers of hoists provide suitable equipment, but sometimes second-hand hoists, usually oversize, are purchased and, though the engine is safe for general operation, the saving in cost may be wiped out during the life of the operation by extra wear on ropes and sheaves and because of the extra power needed to move unnecessarily heavy parts made big to suit the engine which is too large for the job on hand.

Sheave wheels should be of adequate diameter and not of the minimum size that designers or rope salesmen grudgingly will approve. The smaller wheels are not of the rugged construction of larger wheels and they may collapse under rope strain.

If, in sinking shafts, a man must ride the edge of the bucket, he should be attached to the hoist chain by safety belt and short chain. Men should ride inside the bucket; non-spinning ropes should be used and, in a deep shaft, a carrier should be provided above the bucket running on guides.

Openings in the planking over the tops of shafts being sunk should not be made too small. Larger openings with doors as a covering for the protection of the men below afford greater safety when men are being hoisted. The bucket should be steadied carefully before hoisting or lowering. Escape shafts are too often neglected and, in the excitement of an accident when men are striving to leave the mine, are likely to be overloaded.

Gravity planes which have passbys in the middle of the run are undesirable for man-trips. Instead, there should be two straight-away tracks of full plane length. Speed of gravity planes, moreover, is dangerously irregular and occasionally excessive. Such an installation for transporting men should be equipped with an auxiliary engine, powerful enough to operate the plane under perfect control with very slow speed. Outside planes should be located where they will be shielded from rock and snow slides. Plane cars should not be left out all night in extremely cold weather, for the couplings are likely to be so chilled that in operation they may break.

Better loading and unloading stations, locking devices to prevent capsizing, safety catches on doors, if doors are provided, are essential where aerial tramways are used for transportation of men. The men must ride completely within the bucket and only a safe number be carried at one time.

* Abstract of article presented at 32d annual convention of Mine Inspectors' Institute of America, June 4, 1941, Bluefield, W. Va.

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Accident Frequency Rate for Haulage Is 220; Better Car Design Would Lower Rate*

By C. L. LUTTON
Safety Director, H. C. Frick Coke Co.
Pittsburgh, Pa.

ACCIDENT frequencies for mine haulage would have reached the distressingly high figure of almost 220 fatal and non-fatal disabilities per million man-hours worked for the eight years from 1930 to 1937, inclusive had the calculation of the U. S. Bureau of Mines been based on the number of haulage employees in the industry instead of on the number of all the men engaged underground. Reported as the number of such accidents per million man-hours of all underground employees, the figure for that period, however, is 21,724. The smaller figure arises from the fact that the U. S. Bureau of Mines does not have the number of men employed in the several classifications and so makes its calculations on the total number of underground employees.

Man-hours worked by underground transportation employees at many large mines vary from 8 to 12½ per cent of the man-hours worked by all underground employees, so 10 per cent would be a likely average and the 21,724 accidents per million man-hours worked as recorded by the U. S. Bureau of Mines when multiplied by 0.10 would be 217.24, or nearly 220. More recent figures are available, and they are somewhat lower, but they are thus far incomplete and would not furnish a safe basis on which to conclude whether haulage-accident frequency rates have increased or decreased during the last three years and whether the replacement of hand loading by mechanical loading has affected materially the hazards of haulage.

Several of the larger companies have figures based on their own experience that compare the accident frequency of any one group of workmen with the number of man-hours worked by all the individuals in that group and in that group alone.

Other difficulties in getting a true conspectus of the dangers of haulage are that, when haulage workers are killed by a fall, the accident apparently is charged to "falls of roof and coal," a type of accident that is common to many groups of men and not to haulagemen only. Then also when an accident which primarily was caused by a derailment (clearly a haulage defect) results in the dislodgment of a prop and a fall of roof or side, the man who is hurt or killed is marked down as having been injured or killed by a fall, which was, of course, the ultimate, although indirect, cause. So the haulage frequency record is unduly lowered, for with this manner of figuring, this type of haulage accident appears in another classification. Some companies classify accidents according to primary causes, and in this case

* Abstract of article presented at 32d annual convention of Mine Inspectors' Institute of America, June 4, 1941, Bluefield, W. Va.

the accident would be listed as a haulage casualty.

The figures of the Bureau of Mines show that 19.68 per cent of all haulage injuries are sustained "while coupling," the men being either struck, run over, or squeezed between cars or locomotives or squeezed between car and rib, timber or roof. This may seem excessively high, but, seeing that the average mine car has a capacity of about 2½ tons and is coupled twice in each trip, about 351,693,780 couplings and the some number of uncouplings would be made in a year. This is equivalent to 125,381 couplings per disability over the eight-year period 1930-1937. Nevertheless, the hazard of coupling is frequent enough to demand most serious consideration. In the eight-year period the average number of underground haulage accidents while coupling was 2,805 per year.

With certain bad conditions eliminated, haulage accidents could be reduced. Such conditions are: large-capacity cars unequipped with brakes or, if so equipped, furnished with brakes that can be applied or released from one side of the car only; bumpers too short to afford sufficient clearance between cars for safe coupling or uncoupling; couplings that make it hazardous to couple cars, that promote broken trips, and make frequent mine-car repairs necessary, etc. Other causes of accident are headings not driven strictly in conformance to line, thus making it impossible to have adequate clearance at all points; gathering locomotives for thin beds without safety decks on the non-control and whereby brakemen would be protected in part from being crushed between low roof, roof supports, etc., as may occur where comparatively high end-frame locomotives are used.

Recent mine-car designs tend toward low-wheel roller-bearing running gear with bodies extending over the wheels to provide capacity; then, on derailment the car body rests on the track rail or at least prevents use of any available type of rerailing device; the absence of a practical rerailing device other than a lifting jack invites use of improvised blocks, cap-pieces, ties, stiff jacks, etc. A rerailing device for this type of car should be devised.

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Blackdamp Usually Lighter Than Ordinary Air; Ways That Will Keep Mine Air Fresh

IN A PREVIOUS ARTICLE,* it was shown that the light-extinguishing character of mine air was often due not to carbon dioxide but to lack of oxygen or, in other words, to the presence of nitrogen, and that a high-nitrogen blackdamp is often so low in carbon dioxide that it is as light as air or even lighter than air.

Even prior to 1916, when Bulletin 105 was issued by the U. S. Bureau of Mines, most of the blackdamps were lighter than air. Those that were distinctly heavier than air and contained much carbon dioxide—3.05 to 19.60 per cent—were from fire areas. Under the title "Typical Analyses of Coal-Mine Atmospheres Deficient in Oxygen," in Report of Investigations 3327, these analyses are reported and where methane occurs with the methane as part of the mine atmosphere, which of course is a correct way of regarding it. But these figures have been recalculated for this article so that the nitrogen, carbon dioxide and oxygen percentage values would total to 100 by volume. The methane percentages in the tabulation are recorded separately and do not form a part of the 100-per-cent summation. One of the analyses has been omitted because it came from a fire area.

The three gases—nitrogen, carbon dioxide and oxygen—are regarded as forming the blackdamp, with methane as a separate gas having an entirely different source. The methane is recorded in the table after the specific gravity, which gravity has been calculated solely for the blackdamp fraction. The average specific gravity is 0.99964, or 0.036 per cent less than that of air. It will be noted that where the air is recorded as "still" the percentage of carbon dioxide usually was low, appearing to show that the coal takes up that gas whenever it is given time to do so. However, there was one exception to the rule—No. 16 from Westmoreland County, Pennsylvania. Even this had little more than the average carbon dioxide content for the 17 samples and was of lower specific gravity than the average.

It is interesting to note that when coal is crushed and turned in a barrel with air (see Schmidt and Elder, U. S. Bureau of Mines, *Industrial and Engineering Chemistry*, February, 1940, p. 249) instead of the final atmosphere having, like ordinary air, 20.93 per cent by volume of oxygen and 79.04 per cent of nitrogen (including "noble gases," argon, krypton, xenon, neon and helium) with 0.03 per cent of carbon dioxide, it will have only 19.50 per cent of oxygen and as much as 80.15 per cent of nitrogen, yet only 0.30 per cent of carbon dioxide and 0.05 per cent of carbon monoxide. Its specific gravity will be 0.99548. In this case, there is carbon monoxide present, but in very small quantity and, if only oxygen, nitrogen and carbon dioxide were considered, the specific gravity would still be 0.99597.

In the mine there is also the possibility, as stated, that the carbon dioxide will stream down the face and move along the floor and escape the sampler, but in the barrel that possibility is eliminated by the rolling action. It is not clear how long coal continues to take up carbon dioxide; in time probably its avidity for the gas ceases. Perhaps, also, it may after a while cease to form carbon dioxide; that is, lose its reactivity. Again, it is possible that, when pillars are broken by pressure, they will lose their absorbed carbon dioxide, and this may explain in part why there is so much carbon dioxide in old workings, though the condition of the timber might suffice to explain that fact. The crushing of the pillars may explain the outburst of carbon dioxide at Agrappé, but it must be remembered that the escape of carbon dioxide is likely to be greater from the gobs than from the pillars.

In the active part of a mine, oxidation of coal is most rapid, and the air becomes warm. Moreover, the operation of drilling, cutting and loading machines and the more frequent and heavier shots will add to the temperature. This tends to make the blackdamp lighter than its analysis would indicate. In consequence, and because of the addition of methane, it mixes quite readily with the air current and usually may be found in all parts of the mine adjacent to the return. Among the old pillars, heat of decaying timber and lack of active ventilation make the air warm and humid and, if the percentage of carbon dioxide were not so high, this blackdamp would be light also as compared with intake air, for it has heat, humidity and methane to lighten it and set it in motion.

It is obvious that if a mine is to be kept relatively free of carbon dioxide and excess nitrogen, workings should be mined out and caved as soon as possible so as to reduce the quantity of standing coal and thus reduce the deoxidation of the air and the formation of carbon dioxide. Fortunately, that dictum of good operation also will reduce drainage, maintenance and almost every other mining cost. Mechanized mining is fast making a rapid clean-up mandatory. No mine that has acres of standing pillars can have good air. With large quantities of carbon dioxide, periods of low barometer will give the mine foreman a large body of blackdamp to handle.

Analysis by Volume of 17 Atmospheres in American High-Volatile Bituminous Coal Mines With Specific Gravities of the Nitrogen-Carbon Dioxide-Oxygen Fraction

County	State	Position	Nitrogen	CO_2	Oxygen	Specific Gravity	Methane
1—Fayette	Kentucky	Crosscut	79.385	1.211	19.404	1.000,94	0.70
2—Fayette	Kentucky	Main return at upcast shaft	79.680	1.000	19.320	0.999,65	0.05
3—Jefferson	Alabama	Last crosscut in heading	79.327	0.168	20.505	0.996,62	4.56
4—Shelby	Alabama	Still air in room crosscut	79.353	0.225	20.422	0.996,82	6.62
5—Pittsburg	Oklahoma	Main return near air-shaft bottom	79.357	0.712	19.931	0.998,88	0.40
6—Pittsburg	Oklahoma	Room holed to manway	79.180	1.564	19.256	1.002,72	2.16
7—Westmoreland	Pennsylvania	Room at floor 10 ft. inby	80.434	1.170	18.396	0.999,33	0.03
8—Pittsburg	Oklahoma	Manway 6 ft. inby	79.361	1.389	19.250	1.001,74	2.08
9—Pittsburg	Oklahoma	Manway 200 ft. inby	79.357	1.399	19,244	1.001,78	2.10
10—Pittsburg	Oklahoma	Head of aircourse	79.849	1.338	18.813	1.000,85	2.09
11—Pittsburg	Oklahoma	Main return	79.573	1.378	19.049	1.001,40	2.04
12—Shelby	Alabama	Still air, room crosscut	79.534	0.224	20.242	0.996,57	6.43
13—Pittsburg	Oklahoma	Room heading	79.635	1.836	18.529	1.003,25	1.99
14—Monroe	Iowa	Main return	81.020	1.280	17.700	0.998,99	0.00
15—Pittsburg	Oklahoma	Room heading	79.773	2.045	18.182	1.003,94	2.21
16—Westmoreland	Pennsylvania	Room, still air	81.807	1.391	16.802	0.998,37	0.07
17—Tuscaloosa	Alabama	Room heading, 18-in. from roof, 4-ft. from face	82.545	0.106	17.349	0.991,92	5.70
Average			79.951	1.085	18.964	0.999,64	

* "Blackdamp Is Changing as Time Progresses; Less Often Today Is It Rich in CO_2", *Coal Age*, July, 1941, p. 60.

QUESTIONS ASKED BY STATE BOARDS

Queries Asked First and Second Class Foremen At Examination Held in State of Ohio

What Mine Foreman Must Do

Q.—Define a mine foreman's duties as set forth in the Ohio Mining Law.

A.—As stated in the law signed by the Governor of the State of Ohio, June 3, 1941, the mine foreman, under the direction of the superintendent (Sec. 151), "shall carry out all the provisions set forth, see that the regulations prescribed for each class of workmen under his charge are carried out and see that any deviations from any of them are promptly adjusted."

He is required each day (Sec. 141) to enter, or cause to be entered, in ink a report on the condition of the mine, that will set forth clearly any danger he has observed during the day or any dangers his assistants, firebosses or shotfirers have reported. He must report whether a proper supply of material is on hand for the safe working of the mine and whether legal requirements are being met.

Once a week, he shall enter, or cause to be entered, in this book a true report of all air measurements required by this act, designating place, area, and number of men in each split and velocity of air of each crosscut and heading separately, with date when measurements were taken. This book shall be kept in the mine office for the examination of the deputy mine inspector or, in the presence of the mine foreman, for inspection by any person working in the mine. These records the foreman shall certify each day with his signature. He must also read carefully the record book which is kept by the firebosses and sign it in ink daily.

In all mines generating methane in such quantities as may be detected by a flame safety lamp, the mine foreman shall employ (Sec. 142) a sufficient number of competent men holding first-class mine foreman or fireboss certificates to examine the mine for such methane in accord with the law. He himself may act as fireboss. He shall employ a competent man to act as stableman. The mine foreman may delegate his duties unless otherwise specified to a man, or men, who, in his judgment, is or are competent to perform them, but such delegation will not relieve him of responsibility for their performance.

When the ventilating fan or its machinery is seriously interrupted (Sec. 152), he shall promptly order the men to leave the mine and not to return to work until ventilation is restored and until his permission is given for such reentrance. He must provide that power be shut off from the mine except to restore ventilation, and the men must not be allowed to return until he or some competent man whom he has delegated has examined the mine and reported it safe.

The mine foreman shall see (Sec. 153) that all dangerous places and old workings are properly fenced with proper readily-seen danger signals hung on such fencing. He shall travel all airways and examine all the accessible openings to old workings as often as necessary to insure safety.

He shall examine or have examined (Sec. 154) the working place of each person working in the mine on each day, or oftener if in his judgment circumstances so require, and in evidence of such examination the examiner shall mark his initials in chalk on the face of the coal or other conspicuous place with the date of the month on which the inspection was made. Persons so delegated shall not be those regularly employed at the face.

It is the mine foreman's duty under Sec. 155 to order person or persons working in a place that becomes unsafe to cease mining or loading and not remain in such working place until it is made safe, except to bring it to that condition, to see (Sec. 156) that working places are supplied with props, caps and other timbers necessary for the support of the roof and to order men from places where such timber is lacking, to shut off their car supply and promptly order delivery of the needed timber.

The foreman is required also to instruct or arrange for the instruction of inexperienced persons in their mine work until they are capable of performing it (Sec. 158). He must provide (a) that watch be kept over airways and over the operation of ventilation equipment; (b) that the volume of the ventilating current be measured at least once each week at (1) inlet, (2) outlet, (3) near the face in all entries and (4) where distribution to the various working sections begins, and (c) to report these on blanks furnished by the Division of Mines, forwarding such blanks with his signature to the deputy mine inspector on the first day of each month.

What, Why and How of Ventilation

Q.—(a) What is ventilation? (b) Why is ventilation necessary in mines? (c) Name the principal factors for the efficient ventilation of a mine.

A.—(a) Ventilation is the passing of air through a space, such as a heading or room, so as to drive out the air in that space continuously and replace it by other—and preferably purer—air.

(b) Ventilation is necessary in mines (1) because men—and animals if any—underground, as on the surface, need oxygen to sustain life, and they can get it only if enough air is coursed through the mine to supply a sufficient quantity of oxygen for that purpose; (2) because the coal ribs, coal face, lamps, timbers, pyrite and metals take up oxygen and so would deprive the air of its ability to support life if new air were not supplied continually; (3) because, in most mines, some methane is emitted by the coal or is released from the roof or floor, and air must be introduced to carry away this gas, or explosions will occur; (4) because the firing of explosives makes smoke, poisonous and inert gases, and these must be diluted and removed promptly; (5) because otherwise the air would become too hot and moist for the comfort, health and efficiency of the men at work. Fresh air also is necessary for safety, because no one can work safely in the murky atmosphere that, whenever explosives are used, always accompanies inadequate ventilation.

(c) Efficient ventilation requires that the following rules be observed: (1) Sufficient air must be supplied that each man and animal will have all the oxygen needed for its respiratory action despite the withdrawal of that gas by animate beings, inanimate materials and by fungus growths; (2) enough air must be circulated to keep the methane proportion everywhere below 1 per cent except perhaps at the roof, 1 ft. from the face; (3) this air must be so distributed that every man and animal will have sufficient air wherever it may have occasion to go.

(4) The air, preferably, should travel through the workings only once and not return almost to the point where it entered the mine; (5) it should not be recirculated either at the mine mouth or at any point in its travel; that is, none of it should travel twice or more times over the same route gathering impurities during each circuit; (6) some authorities declare that return air from working or from completed places should not be allowed to travel along main haulage roads, as is quite customary in the State of Ohio.

(7) Not more than 85 men should be allowed on a split of air (Law of 1941, Sec. 54) and, in highly mechanized mines, fewer men should be allowed on a split if gas is being generated; (8) to comply with the law (Sec. 56) doors should be in duplicate, so as to provide a complete air lock; (9) sufficient headings for the passage of air should be provided from the start so that, throughout the life of the mine or throughout the extensions of the original system of ventilation, enough air will be assured without excessive water gage.

(10) Tight stoppings and doors should be provided to keep leakage to a minimum; (11) in gassy mines, more air should be provided in advance workings whenever, by mechanical or other means of mining, the speed of advance of such workings is greatly increased; (12) air speed at the face should

not exceed 800 ft. per minute or a dust hazard will be created.

(13) Air speed should not be less than 100 ft. per minute in order to maintain healthful condition; (14) wherever hazards of fire and explosion exist, as in a storage-battery charging station, a transformer station or a motor-generator room, a separate split should be provided with a direct connection to the return; (15) power equipment, unless recognized as "permissible," should not be allowed, in a mine generating gas, to operate beyond the first outby working place. Many of these provisions, though desirable, are not in the law, and some would have no place in such a document.

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Questions, Mine Foremen's Examination Pennsylvania, April 8, 1941*

Q.—If 120,000 foot-pounds impressed on the mine air causes a certain volume to pass through a 7x8-ft. airway per minute, what power in foot-pounds and in horsepower will be required to cause the same volume of air per minute to pass through a 5x5-ft. airway of the same length and of similar roughness?

A.—Perimeter of first airway is $(7+8)2 = 30$ ft.; perimeter of second airway is $(5+5)2 = 20$ ft. Area of first airway is $7 \times 8 = 56$ sq.ft. and of second airway $5 \times 5 = 25$ sq.ft. As the second area is $25 \div 56$ as large as the first area it is obvious that the speed of the air will have to be $56 \div 25$ times as great if the same quantity of air is to be passed. So the velocity will be 2.24 times as great, and as the pressure always varies as the square of the velocity, it will have to be $2.24 \times 2.24 = 5.0176$ times as much as the original pressure. However, the perimeter is smaller as 20 is to 30 or as 1 is to 1.5, so the pressure will be only $5.0176 \div 1.5$ as much as before, or 3.34507 times as much. But the power on the air will equal the pressure multiplied by the velocity, so, as the pressure has been multiplied by 3.34507 and the velocity by 2.24, the power will be multiplied by 3.34507×2.24 or $3.34507 \times 120{,}000 = 899{,}160$ foot-pounds. As there are 33,000 foot-pounds to the horsepower, the horsepower on the air will be 27.247. (2 per cent.)

Q.—(a) Define a mechanical mixture of gases, and cite such a mixture.

(b) Define a chemical compound, and cite a mine gas which is such a compound.

A.—(a) Mechanical mixtures are those in which the substances—solids, liquids, or gases—which form the mixture may be present in any proportion, and the mixture will have properties depending on proportion of the ingredients. The atmosphere about us is an excellent example of a mechanical mixture, as also is afterdamp and firedamp as found in coal mines. (2 per cent.)

(b) A chemical compound is one in which the combining atoms unite in definite fixed proportions according to the chemical laws, which give to the atoms of each element certain combining powers. Thus carbon monoxide is a chemical compound, always consisting of one atom of carbon united with one atom of oxygen. Carbon dioxide also and methane also consist of elements that are combined in definite proportions. Wherever the compound is found the proportions of the elements will be the same or it will be another compound. (2 per cent.)

* Continued from p. 63, *Coal Age*, July, 1941.

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Questions, First Class Mine Managers' Examination, Illinois, 1940 *

Getting More Air From Fan

Q.—A fan running at a speed of 50 r.p.m. produces 60,000 cu.ft. of air per minute with a water gage of 1 in.; how much will the quantity and water gage be increased by speeding the fan to 80 r.p.m.?

A.—The quantity of air yielded by a fan is proportional to its speed of rotation, and the pressure to the square of the speed, or, in this case,
$q = (80 \div 50) \times 60{,}000 = 96{,}000$ cu.ft. per minute; and for the pressure, $p = 1 \times (8 \div 5)^2 = 2.56$ in.

Horsepower for More Air

Q.—A fan running at 60 r.p.m. gives a water gage of 2 in. If speed of fan is increased to 90 r.p.m., what will be the pressure? If the quantity of air after the increase is 100,000 cu.ft. per minute, what will be the horsepower?

A.—Pressure due to 2 in. of water gage is $2x5.2 = 10.4$ lb. per square foot. Assuming that quantity is proportional to speed of the fan, and pressure to square of speed, pressure will equal $10.4 \times \left(\frac{90}{60}\right) = 23.3$ lb. per square foot. Horsepower required for the circulation of 100,000 cu.ft. of air per minute under this pressure would be $qp \div 33{,}000 = 100{,}000 \times 23.4 \div 33{,}000 = 70.0909$ hp.

Equivalent Orifice

Q.—What, in the science of mine ventilation, is meant by the term "equivalent orifice"?

A.—In testing fans, it is found desirable to simulate the resistance of the mine to the passage of air by making the fan draw the air through an orifice, or large hole, in a thin plate. Size of the orifice that will give that water-gage resistance with any volume of air in feet per minute is termed the "equivalent orifice" for that water gage. (It used to be customary to specify the equivalent orifice when purchasing a fan, but the custom today is to quote the water gage instead.)

It is known that the velocity of any body, whether solid, liquid or gas, under a certain head, h, is given by the equation $v^2 = 2gh$ or $v = \sqrt{2gh}$ (a basic law of motion that should be memorized). The value of velocity of air, v, in American mine ventilation problems is always given in feet per *minute*, but the acceleration due to gravity, g, being a figure from the study of the laws of motion—kinematics—is always given in feet per *second* in one *second* and equals 32.158 when at sea level and at the 40th parallel of latitude (Philadelphia, Pa.). That is, the body, solid, liquid or gas is accelerated in one second to 32,158 ft. per second by gravity. However, to get a correct result it will be necessary to convert the expression "acceleration in feet per second in a second" to "acceleration in a minute to a velocity in feet per minute," which would change its value from 32.158 to $32.158 \times 60 \times 60$ ft. per minute in a minute.

It is clear that the quantity of air passing, or q, will equal the velocity of the stream, v, multiplied by the area of the cross-section the air occupies in its travel. However, when air is passing through an orifice in a thin plate, some of it crowds in from the sides and the shape of the stream at right angles to the plate is a cone, not a cylinder, so that the actual area occupied by the stream at a point away from the plate a short distance (about equal to half the diameter of the orifice) is only 62 per cent as large as the area of the orifice.

Hence, if the area of the opening is a, the size of the minimum area that the air will occupy will be only 0.62 a and that is the area that would determine the quantity of air traveling. However, the speed also is reduced by the throttling at the orifice, so the discharge coefficient is 0.61 (Marks' Handbook, p. 259). Thus, $q = 0.61a\sqrt{2gh} = 0.61a \times \sqrt{2 \times 32.158 \times 60 \times 60h} = 0.61a \times 60\sqrt{2 \times 32.158h} = 0.61a \times 60\sqrt{2} \times \sqrt{32.158} \times \sqrt{h} = 293.5221a\sqrt{h}$.

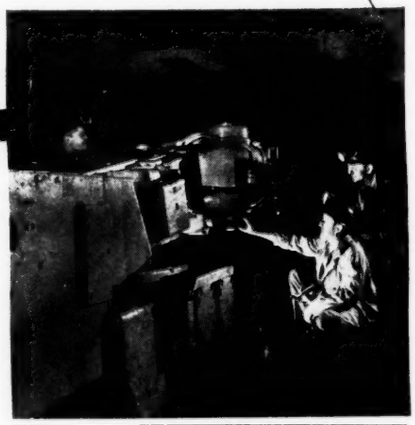
But in ventilation we are interested not in head, h, but in water gage, i. One cubic foot of water at 60 deg. F. weighs 62.116 lb., and one cubic foot of air at the same temperature and 30 in. of mercury pressure weighs 0.07655 lb. (U. S. Bureau of Mines, I.C. 6983). Thus, at these temperatures, water is 81.443 times as heavy as air. Therefore 1 in. of water will weigh as much as 811.443 ft. of air $\div$ 12 or 67.62 ft. Therefore $h = 67.62 \times i$, and $q = 293.5221a\sqrt{67.62i} = 293.5221 \times 8.223a\sqrt{i}$, and $a = q \div 293.5221 \times 8.223\sqrt{i} = 0.000414 \div \sqrt{i}$.

This figure will vary with the latitude for which it is calculated, the height above sea level and the pressure of the air, but the factor usually runs from 0.00038 to 0.0004. Equivalent area = about $0.000414 \div \sqrt{i}$.

* Continued from p. 81, *Coal Age*, June, 1941.

"with GULF QUALITY LUBRICANTS WE'VE INSURED LONG LOW-COST SERVICE FROM THIS NEW CUTTER"

—Says this Maintenance Foreman



Actual photograph of a Gulf engineer consulting with Maintenance Foreman on the lubrication of a new cutting machine, which is mounted on rubber tires.

"To give this costly equipment sure protection, we called in a Gulf engineer right at the start."

"I'M responsible," says this Maintenance Foreman, "for keeping this new cutter in continuous operation — with little maintenance expense. That's why I called in a Gulf engineer right at the start. Lubricated with the quality lubricants he has recommended, I'm sure this equipment will give us long low-cost service."

This Maintenance Foreman has reason to be confident that he has provided maximum protection for this new cutter! For he is familiar with the fine service records of other mine equipment lubricated as recommended by a Gulf engineer.

Are *you* seeking long low-cost service from your equipment? Ask a Gulf engineer to give you his suggestions for its proper lubrication. You can benefit from his thorough training and broad experience with all types of equipment similar to yours.

The Gulf line of more than 400 quality oils and greases is quickly available to you through 1200 warehouses in 30 states from Maine to New Mexico. Write or 'phone your nearest Gulf office today.

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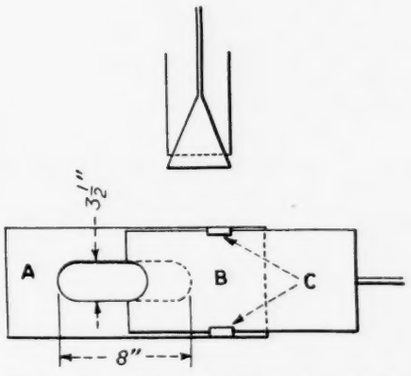
WHAT'S NEW IN OPERATING IDEAS

Larger Opening for Its "Size" Is Slide Valve Advantage

Changing from a rising cone-type valve to a horizontal slide-type valve with slots having rounded ends eliminated clogging difficulties experienced in controlling the feed of slurry to a new Elmore continuous centrifugal dryer at the Sentry Coal Mining Co.'s preparation plant, near Madisonville, Ky. The cone valve had the disadvantage that in restricting the flow the opening available to the larger particles of coal became inadequate for their passage before the total area was diminished sufficiently to reduce the rate to the desired quantity.

In the drawing, which shows an elevation of the cone-type valve and a plan of the slide valve, the difference in the minimum openings for a given total stream area is apparent. The minimum dimension of 3½ in. is not reached in the slide valve until the 3½x8-in. opening has been restricted to the area of the 3½-in. circle. When an equivalent area is reached with the cone the minimum dimension of the annular opening is a fraction of an inch.

Plate *A*, which is stationary, has the 3½x8-in. slot. Plate *B*, the slide, has only a semicircular 1¾-in. radius notch at the end. Clips *C*, which are pieces of angle 3-in. long attached to the vertical sides of the valve box, serve to keep the slide down when it is being forced in from the extreme open position. Without those angle-iron guides, there was a tendency for the slide to start riding up through the material.



Slide valve which eliminated trouble with the cone-type shown above.

E. E. Price, foreman of the preparation plant, designed the new valve. In the illustration, E. O. Arbogast, one of the plant operators, is making an adjustment of the feed. The valve box is at the bottom of a small cone which acts as a surge bin.

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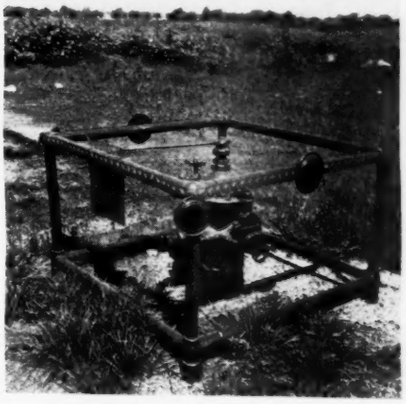
Railing Set in Concrete Guards Fire Hydrant

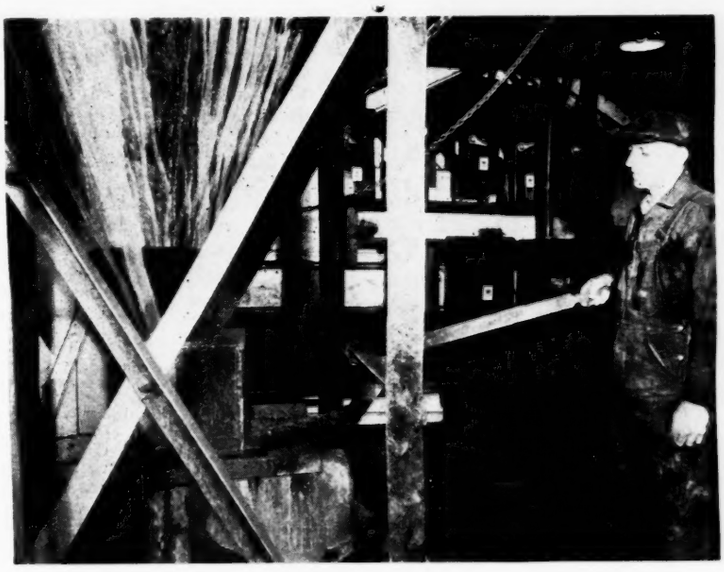
Growth in night trucking, writes K. N. Banthin, mining engineer, Louisville, Ky., plus a greater number of less experienced drivers, has focussed attention on the guarding and marking of yard facilities to prevent their being knocked down or damaged by trucks. "White paint and whitewash have been used to mark many of the larger items but require frequent going over, since they smudge easily from coal dust. Various types of reflector signals have been installed along the roadways and in the empty parking lots to mark the paths for the truckers.

"To guard the vital fire hydrants near the parking lot at one property, railings of 2-in. pipe were fabricated in the shop and set in concrete piers around the hydrants.



Pipe railing marked by buttons and reflectors guards hydrant.

To mark these guards and also the hydrants, a continuous belt of 1-in. red reflector buttons was placed around the entire top rail. In addition, a few amber reflectors were placed on the sides of the traffic flow. A few poles have been damaged but none of the hydrants with the type of guard shown in the accompanying illustration has even been touched."



Control without clogging the feed.

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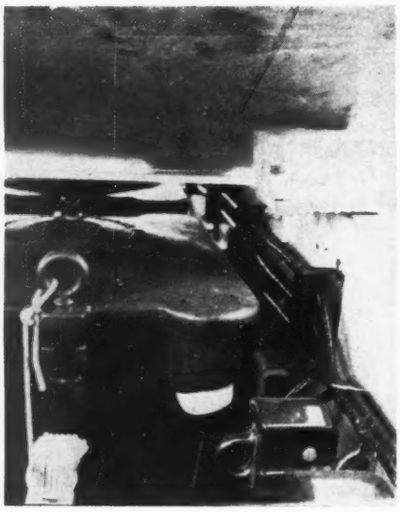
Southern Illinois Mines Use Portable Substations

Union Colliery Co. and Valier Coal Co., in southern Illinois, have built all-steel totally inclosed transformer substations mounted on wheels for their 2300/230-volt three-phase underground power-distribution systems. These portable substations are large enough to hold three 25-kva. transformers, which are protected on the 2300-volt side by porcelain-incased fuses and an FK-20 General Electric oil circuit breaker. The secondary side is protected by a fused hand-operated knife switch in the Union Colliery substations, and by a three-pole Westinghouse De-ion circuit breaker in the Valier sets. High-voltage connections are to 5,000-volt three-conductor cables run along the floor or covered up in shallow ditches.

Union Colliery sets take advantage of some



Union Colliery substation showing high-voltage wiring and cotton rope used to hold the hinged covers up for ventilation.

air cooling by holding up the two hinged doors with a cotton clothes line threaded through and tied to a support overhead. In case of a transformer fire, the rope will be burned in two and the doors drop, cutting off the flame. The Valier sets are permanently inclosed when in operation.

The plates from which the inclosures are built are of No. 8 steel about $\frac{3}{16}$ in. thick. Both mines coat the inclosures with aluminum paint, which is a help to visibility and adheres well—even in the case of mine locomotives, which are always on the move.

Advantages to accrue from these steel-inclosed portable sets include: (a) safety from fire hazard; (b) better protection of men from electric shock; (c) protection of equipment and wiring connections from falls; (d) cost of fixed fireproof inclosures eliminated; (e) stations can be moved and be back in service in a shift—at little expense and no loss in operating time.

Dustproofing Coal With Oil Requires Right Choice

In dustproofing coal with oil, "the problem is to coat the coal pieces with the proper oil to glue the fine dust particles to the larger pieces of coal," states the Viking Mfg. Co., Jackson, Mich., in an analysis of the "Fundamentals of Controlling Dust on Coal." Two factors, the company continues, "tend to disrupt the oil film on the surface of coal, viz: evaporation and penetration. An oil must be selected which is heavy enough in body so that it will not evaporate when spread in a thin film and exposed to the air. This means an oil that has been distilled at a high enough temperature that all gasoline, kerosene and fuel oil have been driven off before it is applied to the coal. If an oil of too light a body is used it will evaporate and be absorbed and will fail as a treating agent.

"Coal varies in inherent moisture and volatile, both of which have a bearing on the treating film. Since dust must be glued to the larger pieces of coal, then it must be certain that this thin film of oil remains on the surface. Coal is made up of layers and there is a tendency for oil to be drawn in between the layers. In the process of producing coal, many fine cracks are formed which would draw the lighter-bodied oils below the surface. Thus, the film would be lost for the purpose of dust control. Low-volatile coal produces a greater quantity of dust because it is softer and the carbon wears off more easily. Coal with a high inherent moisture and high volatile tends to lose some of these properties in storage and the voids caused by these losses tend to draw the oil film below the surface.

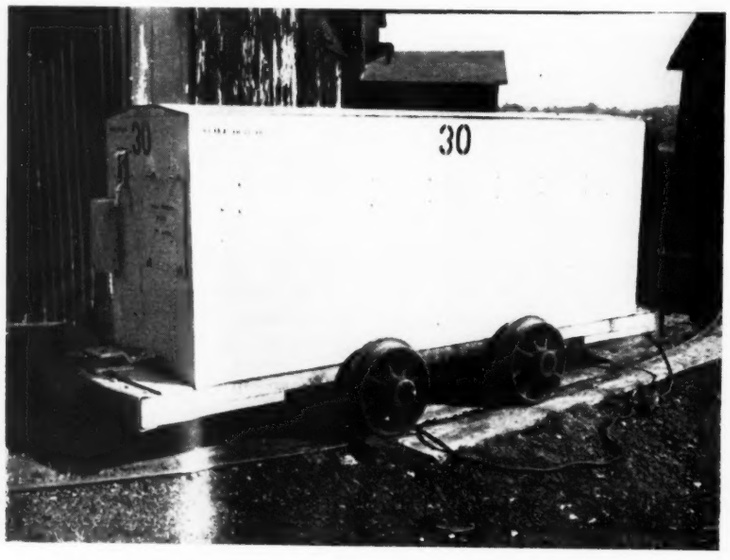
"The problem is to select an oil that has the light ends distilled out so that it will not evaporate when spread in a very thin film and be heavy enough in body to withstand the pull of absorption into the cracks and pores of coal. It is very important to apply an oil with the proper body to control evaporation and penetration. The heavy-bodied oils that are necessary to control evaporation and penetration on high-inherent-moisture high-volatile coal would not be satisfactory on a low-inherent-moisture low-volatile coal just as surely as an oil suitable for a low-inherent-moisture low-volatile coal would be lost in a short period of time on a high-inherent-moisture high-volatile coal. Oil has the advantageous characteristic that a body can be selected which will meet the variables that are found in coal.

"The proper oil for dust-treating can be selected only after a study of the analysis of the coal. Low-inherent-moisture low-volatile coal generally can be sati-factorily dustproofed with an oil having the physical characteristics of 300 viscosity at 100 deg. F. and a low cold test. To dustproof high-inherent-moisture high-volatile coal, oils are required with viscosities of 600 to 2,500 sec. at 100 deg. F. In either case, the flash point should not be appreciably less than 300 deg. F. The oil film on these high-moisture high-volatile coals preserves them so that there is less degradation, because the oil film retards the loss of inherent moisture and volatile from the coal.

"Black oils that are not so highly refined or blended residual oils are entirely satisfactory if they meet the above specifications. These black or blended residual oils generally are less expensive and can be made up from stock that will not be used in the defense industries, therefore assuring the producer of coal an ample supply of low-cost dustproofing materials."

In applying the oil, it is divided into a very fine mist and the coal is passed through this mist in a hooded inclosure. The mist settles on the coal and remains on the surface to glue the fine dust particles to the larger coal pieces. "The high-inherent-moisture and volatile coals will stand storage much better because the oil film tends to seal the inherent moisture and volatile in the coal.

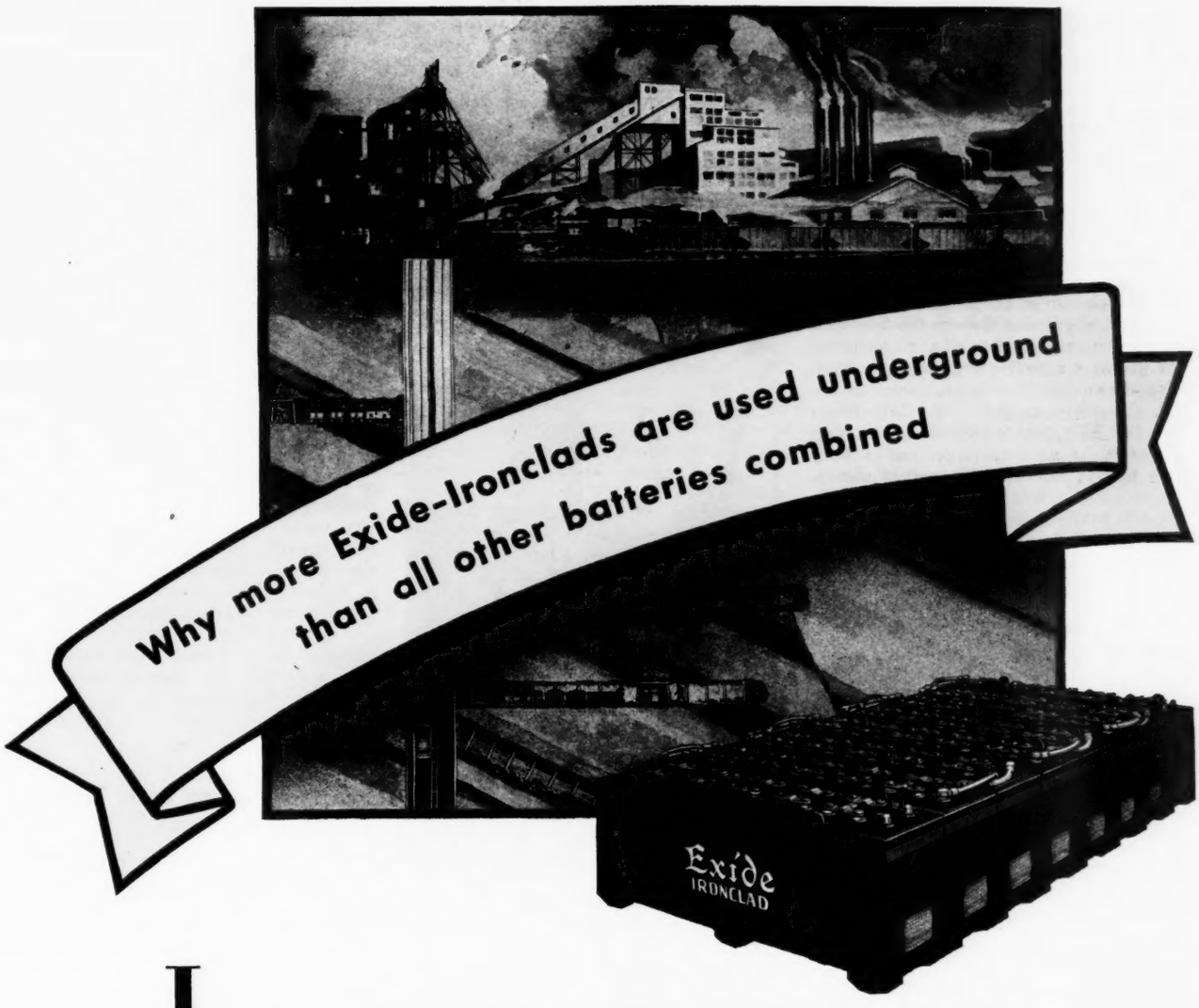
"The body of an oil changes with every change in temperature and this body is measured in terms of viscosity. The standard



High-voltage end of Valier substation showing oil circuit-breaker handle, cable entrance shield and fuse door. Fuse capacity noted on the door. Serial number and date built are stenciled on the body.

Snap

Webster gives one definition of "snap" as "done, performed, made, executed, carried through, or the like, quickly and without deliberation." Or, to put it another way, acting with snap means acting without the necessity of stopping to puzzle things out. There are times, of course, when it is necessary to study a situation in order to arrive at a solution, even though it means holding up the works in the meantime. But the more knowledge a man acquires the closer he can come to snap action on most of the problems of the day, with consequent saving in time and money and greater safety. This department is run to supply the knowledge in the form of selected kinks from all sections of the country. So if you have an operating, electrical, mechanical or safety hint that has saved you time, money or injuries, here is the place to pass it on. Include a sketch or photo if it will help to make it clearer. For each acceptable idea, Coal Age will pay $5 or more on publication.



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temperature for testing oils used in dust-proofing coal is 100 deg. F. An oil having a 100 viscosity at 100 deg. F. means that 60 c.c. of this oil heated to 100 deg. F. passes through a small tube with a fixed opening in 100 seconds of time. An oil of 300 viscosity at 100 deg. F. has three times as heavy a body as an oil of 100 viscosity at 100 deg. F., meaning that it requires 300 seconds of time for 60 c.c. to pass through the same meter. Likewise, 2,500 viscosity at 100 deg. F. means that 60 c.c. requires 2,500 seconds to pass through the same meter.

"A comparison of the resistance of different-bodied oils passing through the fixed tube in the meter shows that an oil can be selected that will have a body great enough to resist being drawn into cracks and pores in the coal. Therefore, an oil should be selected with the light ends distilled out so that there will be no evaporation and a body heavy enough to control the pull of absorption into the cracks and pores. Then, the film will stay on the surface to glue the dust and seal the coal for storage."

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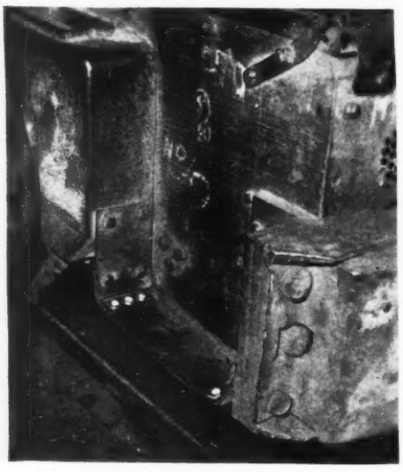
Cat Eyes on Locomotive Step Make for Safety

"So far, the men are swearing by them and feel that they are a big step toward more complete safety," writes A. G. Shaffer, chief electrician underground, New Orient mine, West Frankfort, Ill., of the reflector buttons, or cat eyes, installed on the snapper's steps of gathering locomotives. As shown in the accompanying illustration, three buttons are mounted at each end of the step. With reflected light from a cap lamp or any other source, these buttons clearly outline the step at all times.

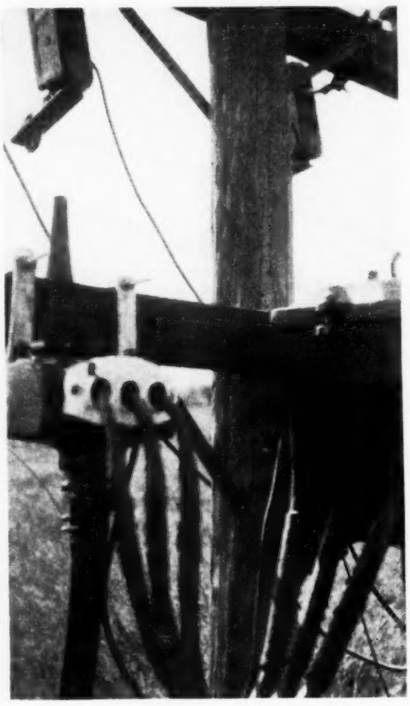
Two accidents in the mine during 1940, in which motormen had feet injured as a result of missing the step, started the mine management searching for a way of eliminating, if possible, any physical hazard that existed. It was concluded that misjudging the location of the step was the principal hazard and that the reflector buttons offered an efficient, low-cost and low-maintenance solution. Steps on 7-AU track-mounted cutting machines also are being equipped with the buttons, says Mr. Shaffer.



Buttons clearly indicate location of step.

5,000-Volt Cables Terminated In Condulet Fittings

"A very good way of caring for the ends of 5,000-volt cables," states Lyman Ellrick, electrical engineer, Hickory Grove Coal Mining Corporation, Sullivan, Ind., is shown in the accompanying illustration.



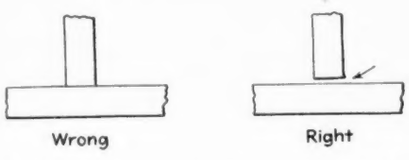
Showing 5,000-volt cable brought into condulet fitting.

The cable is clamped with a Greenfield connector to a condulet fitting filled with compound. The shields for the cable conductors are soldered inside to a bolt which extends through the fitting outside to the ground. Miller 5,000-volt connectors are used on the cable leads.

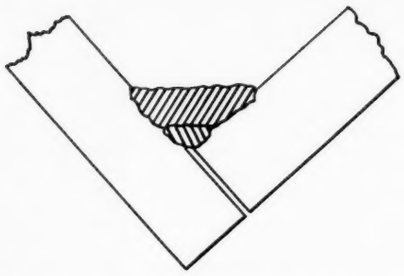
•

Good Design Reduces Chances Of Cracked Welds

"With modern heavily coated electrodes, weld metal generally is so ductile that if joint design is correct, cracked welds never should occur, particularly in mild steel," comments *Welding Briefs*, publication of the Metal & Thermit Corporation. "In making heavy fillets, for example, leaving a small space between plates when they are fitted up and tack welded allows the welds to shrink freely on cooling and thus prevents cracking. Providing exactly the proper spacing, in fact, will permit the plates to be pulled tightly together without causing any locked-up stresses in the weld.



Leaving space permits the weld to shrink freely and thus prevents cracking.



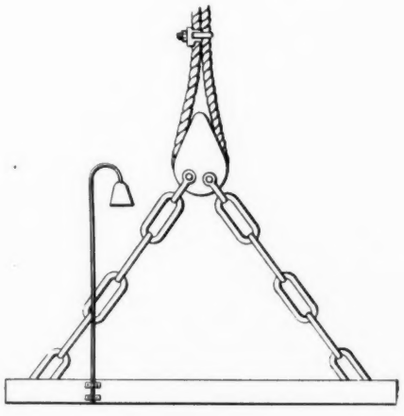
Showing use of low-penetration rod for root weld in joining high-carbon steels to prevent carbon pick-up.

"Where high-carbon steels are being welded, the use in the root of the weld of an electrode with limited penetrating qualities reduces pick up of carbon from the parent metal and prevents excess tensile strength and a correspondingly low ductility in the weld metal. In some cases, it is desirable to substitute two-layer welds for single-pass fillets, putting in a small root weld with a low-penetration rod and finishing the weld with a rod having physical properties more nearly equal to the material being welded."

•

Bell Mounted on Cage Top Warns of Approach

At a southern Illinois mine, livestock bells constitute safety devices affixed permanently to the tops of cages used for hoisting both cars and men. Normal vibration of the cage due to very slight imperfections in guide alignment sets the bell to ringing and serves to warn that the cage is in motion. The original reason for installing the bell was to remind maintenance men working in the pipe and cable compartment to keep themselves and tools clear of the hoisting compartment.



Bell mounted on top of cage.

A livestock bell of medium size (about 4 in. high) is used. Its mounting is a 3½-ft. mast made of No. 9 spring steel wire clamped rigidly at the bottom and bent at the top like a shepherd's staff so the bell hangs on it in normal position.

WHAT'S NEW IN THE FIELD

Southern Appalachian Operators Sign Pact Conceding Main Union Demands

BITUMINOUS coal operators of the Southern Appalachian field formally signed a new wage contract on July 6 with the United Mine Workers, thereby averting another walkout of miners which had been set for July 8. In the new pact, signed in the board room of Producers' Board No. 7, in Washington, D. C., John L. Lewis, president of the U.M.W., won his major demands for elimination of the 40c. daily wage differential between Northern and Southern mines, for vacations with pay, and for extension of the union shop to mines of the Harlan County (Kentucky) Coal Operators' Association, last of the big coal fields to be organized and the last holdout among the Southern group.

Under the new contract the basic daily wage rate in both the North and South is $7 (in the old agreement, which expired March 31, it was $6 in the North and $5.60 in the South). All increases are retroactive to May 1, when work was resumed after a month's shutdown in both the North and South, the resumption having been suggested by President Roosevelt as coal supplies dwindled (*Coal Age*, May, 1941, p. 77).

Negotiations Long Drawn Out

Effective until March 31, 1943, the agreement was reached only after negotiations lasting nearly five months, during which the Southern producers bolted the joint conferences. It differs in no important detail from the pact signed by the Northern group on June 19. Mr. Lewis succeeded in retaining two clauses said to be particularly objectionable to the Southern group and which the National Defense Mediation Board recommended should be eliminated. The union leader insisted that the 13 Southern operators' associations agree to the provision which reserves for the international union "the right to call and maintain strikes throughout the entire area covered by this agreement when necessary to preserve and maintain the integrity and competitive parity of this agreement," although he appended to the contract a memorandum declaring that the clause "has no relation to and will not be utilized to inaugurate or institute the general practice of allocation of production within the Appalachian area."

The other clause marked for omission by the Mediation Board but retained in the final contract gives the union the right to designate "memorial periods," to dramatize mine accidents and arouse public sentiment for more efficient safety devices.

As recommended by the Mediation Board, over the protests of the Southern operators, the controversial reject clause was eliminated from the master agreement. Under this provision, miners were paid only for clean and marketable coal produced. At the request of the Southern producers and at the suggestion of the Mediation Board, Mr. Lewis agreed to sign the following memorandum: "It is understood that any individual coal company suffering financial hardship due to the elimination of the reject practice may request an examination of its problems under the joint machinery of the agreement set forth in the 'settlement of disputes' clause. The utilization of this machinery will determine whether or not relief will be given to the petitioner under the agreement. All requests for such reviews and relief shall be filed within a period of 90 days from the signing of this agreement."

Soon after the agreement was signed Mr. Lewis dictated the following statement:

"Mr. L. Ebersole Gaines [chairman of the Southern group] and I announce the signing and executing of a joint Southern Appalachian agreement. It represents the work of several months' negotiations and affects interests of great magnitude, vital to the welfare and stability of our domestic economy and national defense program. We each express our satisfaction in the accomplishment. The industry will now be able to go forward in a program of increasing production, while working out the details of the several district agreements, which will be taken up in due order, and in our judgment represent no difficult task."

Mr. Gaines, when asked if he wished to add anything to Mr. Lewis' remarks, said that he thought the union chieftain had given "a very good statement."

Mr. Gaines signed first, as chairman of the Southern group and as vice president of the New River Coal Operators' Association. Then Mr. Lewis signed for himself and for Philip Murray, vice president, U.M.W., and Thomas Kennedy, secretary-treasurer. W. J. Cunningham signed for himself and for George S. Ward, representing the Harlan County Coal Operators' Association, which ten days previously had declined to join the other 12 associations in signing the agreement.

Coming Meetings

- Seventh Annual Southern Appalachian Industrial Exhibit: Aug. 21, 22 and 23, Norfolk & Western Freight Terminal, Bluefield, W. Va.
- National Safety Council: 30th National Safety Congress and Exposition, Oct. 6-10, Stevens Hotel, Chicago, Ill.
- Coal Producers' Association of Illinois: annual meeting, Oct. 14, Springfield, Ill.
- Ohio Valley Section, A.I.M.E., and Open Hearth Steel Committee: Oct. 17-18, Columbus, Ohio.
- Fifth annual joint Fuels Conference under auspices of Coal Division of A.I.M.E. and Fuels Division of A.S.M.E.; Oct. 30-Nov. 1, Hotel Easton, Easton, Pa.
- Illinois Mining Institute: 49th annual meeting, Oct. 31, Hotel Abraham Lincoln, Springfield, Ill.
- West Virginia Coal Mining Institute: annual meeting, Nov. 7 and 8, Hotel Morgan, Morgantown, W. Va.

U. P. Old Timers' Association Has 17th Annual Reunion

The annual reunion of the Union Pacific Coal Co.'s Old Timers' Association—the 17th—was held June 21 at Rock Springs, Wyo. With a first aid meet in the Old Timers' Building as a prologue, on the preceding day, the reunion exercises included the usual parade with music by the Superior band and McAuliffe's famous Kilty band of bagpipers, as well as two bands from Rock Springs and one from Hanna.

Following the parade a turkey dinner was served and there were addresses by President Eugene McAuliffe, General Manager I. N. Bayless, Governor Nels H. Smith of Wyoming, Senator H. H. Schwartz, Vice President Pryde, W. M. Jeffers, president, Union Pacific R. R., and William R. Chedsey, administrative head of the Missouri School of Mines and Metallurgy. There also were a soft-ball game for women and a Bocci Balli game.

New officers chosen were: President, Henry Jones, Hanna; vice president, Port J. Ward, Superior; secretary, Andrew G. Hood, Superior; treasurer, Frank Tallmire, Rock Springs; board of governors (one year), William McPhie, Reliance, and William Moon, Winton. Included among the 834 members are veterans of 40, 45, 50, 55 and 60 years' service.

To Open New Mine

Work on opening a new mine at Esco, Ky., 16 miles south of Pikeville on the Chesapeake & Ohio Ry., began late in June. The new operation, owned by the reorganized Utilities Elkhorn Coal Co., is expected to be producing coal by Nov. 1, according to Thomas P. Durell, president. John E. Bowman, Pikeville, who has been manager and treasurer of the company for the last few years, is vice president and general manager, and F. W. Budde, formerly of St. Louis, is treasurer.

Rocky Mountain Coal Men Hail Modernization, Condemn National Water-Power Policy

MODERNIZATION for greater efficiency was the unannounced theme song of the Rocky Mountain Coal Mining Institute at its 39th regular meeting, Denver, Colo., June 26-28. The scope of the program included not only operating methods and practices but also reorganization of capital structure and personnel building. Safety, too, was again emphasized. Resolutions were adopted favoring "justifiable priority" for coal requirements and condemning the national power policy for ignoring economic and employment factors.

According to the Brookings Institute, said D. H. Pape, president, Sheridan-Wyoming Coal Co., full adoption of the Norris and related plans for federal hydroelectric development would displace 380,000,000 tons of coal and put 1,000,000 miners and railroad workers on the unemployment rolls. The St. Lawrence waterway project was characterized as not necessary in the interest of national defense and against the best interests of industry.

Wyoming Mine Makes Record

Last year Sheridan-Wyoming Coal Co. produced 14.84 tons per man-day—a record for deep-mine operation. In 1938, when the average for the country was 4.89 tons, Sheridan-Wyoming, stated Mr. Pape, averaged 10.61 tons. Back of this record is a story of consolidation, concentration and modernization while mushroom markets were disappearing and normal markets were shrinking under the impact of competition and increased efficiency in fuel utilization.

Discussion of the changes effected in the Sheridan-Wyoming set-up to meet these conditions was prefaced by an outline of production trends for the bituminous industry as a whole (see Table I) and the causes back of these trends. Western coals, explained Mr. Pape, have suffered more severely in the downswings because of their lower rank; they "are the first to be restricted to their natural markets." Competition and more efficient utilization have caused Sheridan County output to drop from 1,005,000 tons in 1914 to 606,583 tons in 1940.

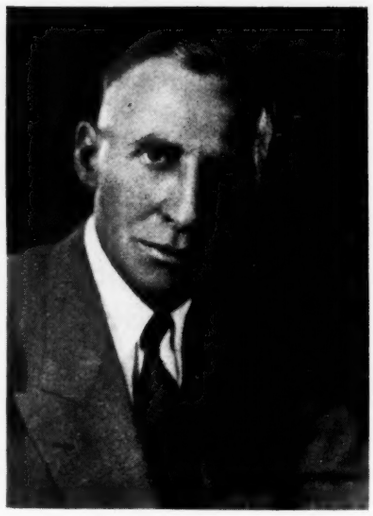
Production in the five Rocky Mountain States last year was 20,552,702 tons. But increased efficiency in power generation since 1918 enabled the public utilities of the country to burn 49,703,104 tons less coal last year than would have been required had 1918 efficiencies still prevailed. At 1918 rates, railroad fuel consumption last year would have been 31,741,000 tons greater than it was. Oil and gas consumption in markets served by Sheridan County coal in 1937 was equivalent to 26,262,248 tons.

The Sheridan-Wyoming Coal Co., organized in 1920, was a consolidation of six companies then operating eight mines. Today operations are concentrated at a single mine—Monarch—which, if demand warrants, can produce as much coal as all six companies did in 1920. Mechanization started in 1925 (*Coal Age*, Jan. 28, 1926, p. 151) and reached the 100 per cent stage in 1936. A new modernization program was launched in 1939 and completed last year (*Coal Age*, May, 1941, p. 39).

Table I—Index Numbers for Bituminous Coal Production

	United States	Rocky Mountain*	Wyoming	Sheridan County
1914	100	100	100	100
1918	137	150	146	197
1919	110	128	112	130
1920	135	153	149	190
1922	100	111	92	81
1923	134	122	117	91
1929	127	117	104	77
1932	73	69	64	48
1937	105	85	91	64
1939	92	81	84	58
1940	107	87	90	60

* Colorado, Montana, Utah, Washington and Wyoming.



W. N. Wetzel
President, Rocky Mountain Coal Mining Institute

Capitalization at the time of organization was $7,080,000, or $5.40 per ton of annual output, as compared with $5.95 for the industry as a whole and $9.10 for the Great Plains, Rocky Mountain and Pacific Coast States. Reorganization of the financial structure in 1927 shrunk total capitalization to $4,840,000. Reduction from $3,000,000 to $928,621.53 in outstanding first mortgage bonds brought capitalization down to $2,768,681.53 at the end of 1940. This, on the basis of last year's tonnage, was $4.74 per ton of annual output.

With the steady march of mechanical loading, accurate costs records for each mechanized unit assume great significance, said Arthur C. Green, vice president, Goodman Manufacturing Co., in a paper presented by Morris Cunningham, district representative. The paper, abstracted on pp. 45-46 of this

Rocky Mountain coal men take time out from 39th regula[r] [Institute]

issue, gave detailed figures for an operation where actual loading and car-change accounts for over 80 per cent of the machine-shift time and the management has set 90 per cent as its goal.

Answering Glenn A. Knox, general manager, Gunn-Quealy Coal Co., Mr. Cunningham stated that he knew of no track-mounted machine operating in steeply pitching seams. Fifteen per cent was the maximum grade for this machine, with most grades between 8 and 12 per cent. One such machine had averaged 420 tons per shift for an entire month. Development in pitching seams with mobile loaders at the Reliance and Winton mines of the Union Pacific Coal Co. was reviewed by John E. Willson and Frank P. Lebar, resident engineers, in a paper originally presented at the February meeting of A.I.M.E. in New York (*Coal Age*, March, 1941, pp. 81, 82).

Industry today, declared Myron D. Williams, deputy State mine inspector, Walsenburg, Colo., is demanding foremen who can function managerially as teachers and as personnel workers. As a manager, the foreman is expected to maintain production at satisfactory costs, keep machines running smoothly, have an adequate labor supply and be responsible for safe operating conditions.

Industry Must Carry Load

State mining departments are not in a position to do more than prepare men for foremen and fireboss certificates. The more intensive training must be carried on by the employers. Mechanized mines, continued Mr. Williams, have the best chance to do this. When loading crews are carefully picked, some of the "lead" men can be developed into supervisors. Most of the trainees, however, will drop out when they realize that success means "long hours in hard work and study."

Carelessness should not be tolerated—particularly in an official. Experience has shown that men trained in accident prevention, first aid and rescue work are safety-conscious. Where timbering and maintenance standards have been established, the foremen should see that those standards are observed. War conditions are bringing back some markets, but what of the future? "Will we miss the mark this time by refusing to train men as we did in 1928 for the lack of chemists and engineers?"

Service-training programs in the industry, said H. A. Tieman, State director of vocational training for Colorado, lack continuity and organization. Mine managements and educators seem to avoid getting together. The job of the educator in vocational training is to show the man who knows his subject intimately from practical experience how to teach it.

Training need not stop with the miners. Foremen's conferences, continued Mr. Tieman, are highly desirable, but their conduct requires a different technique. In discussing accident problems, for example, the approach should be: (1) possible causes, (2) cost, and (3) possible remedies. Operating problems should be attacked in a comparable manner. Training is more than ever important now because of the loss of some of the best workers to defense industries.

Training is vital in the present emergency not merely to provide skilled labor, asserted George M. Kirk, on leave from Colorado Fuel & Iron Corporation, to serve as district representative for OPM, but to weld the country into a united nation. Just as iron, limestone and coal are necessary for the making of steel, there must be a combination of motives to effect and preserve American standards. The profit motive of rugged individualism must be harmonized with the social-gains motive lest complete dominance of the latter bring ragged collectivism. To these two must be added religion, morality, ethics and philosophy so that the American way may be an upright, socially minded, profitable and gracious way of living.

Explosions Are Preventable

Explosions can be prevented was the message of a talkie produced by the U. S. Bureau of Mines, with J. J. Forbes, supervising engineer, safety division, as narrator. W. H. Forbes, district engineer of the Bureau, introduced the film. The movie stressed adequate ventilation, rock-dusting, frequent inspection for methane, and water to keep down dust. Use of non-permissible explosives and of non-permissible equipment in gassy mines was condemned. Falls should be cleaned up promptly; doors, if used, should be in pairs to form air-locks and should close automatically. Line brattice should be properly constructed and should not be left in service in a damaged condition.

Mark Twain's famous remark that everybody talked about the weather but nobody did anything about it might well be applied to treated timbers, declared Thomas Allen, Colorado chief coal mine inspector. Yet treated timbers mean longer life, lower costs and greater safety. With untreated timbers in wet mines, the bottoms on the low side may be rotted out and even daily inspections of roadways will not reveal the condition. Why not, he asked, a concrete prop foot? Rotten timbers cause falls and caves.

An ideal coal screen, said William M.

Not So Backward!

"Notwithstanding constantly increasing wages and shortened work days, through various methods operating costs can be materially lowered and the coal industry placed in a position to substantially meet the competition of substitute fuels. . . . In the face of a tremendous loss in tonnage since 1920 and other adverse conditions, the coal industry has exercised as great skill and ingenuity in the management of its business as other nationally important industries. As a result, it is now offering improved prepared coal to the consuming public at one-half the f.o.b. mine price in the 1917-20 World War period."—D. H. Pape, president, Sheridan-Wyoming Coal Co.

...th regular ...institute meeting to be mugged for the pictorial record.

Wallace, sales representative, Allis-Chalmers Manufacturing Co., should be low in initial cost, segregate efficiently the small material, require minimum power and headroom, be durably constructed and, "most important, cause minimum degradation." In properly engineering a screen for a particular service there are a number of important factors that must be given an A-1 rating. Among these, as related to vibrating screens, are:

Important Factors

1. With length constant, increase in width increases capacity directly in proportion to the width. With width and capacity constant, increasing screen length increases efficiency. Capacity, therefore, is approximately proportional to the screening area. In most cases, length should be at least twice the width of the screen.

2. An excessive amount of fines or oversize in the feed increases capacity providing depth of material on the screen is such that each particle can come in contact with screen surface during passage over the screen.

3. A large percentage of material slightly smaller than the screen opening will decrease the capacity.

4. Material which is generally round or elliptical in shape increases capacity over sharp or irregularly shaped pieces about 25 per cent.

5. Dry materials clean best at higher temperatures, depending on the nature of the material.

6. With sizes up to 1-in., wet screening increases the capacity of screens where the material is sprayed with high-pressure water during the operation.

7. In wet screening, beware of material containing clay balls and stone having clay adhering to it that will not readily dissolve in water.

8. Screen capacity should be adequate to handle the maximum possible momentary surge load which might occur.

9. The thickness of the bed on top of any vibrating screen deck should never exceed approximately three times the opening dimension in the deck at a point near the center of the screen.

10. Material containing 1 per cent or less of moisture by weight usually is considered dry for fine screening or fine grinding.

11. A screen usually operates at the highest efficiency at approximately 75 per cent of its rated capacity.

In stationary bar screens, said Mr. Wallace, the angle of inclination is directly affected by the coefficient of friction between the material of the bars and the material being screened, and by the spacing between bars and the size of the coal. Too steep a slope will cause the material to flow too fast for good separation. If insufficient slope is provided, the material will not flow by gravity.

While the bar screen has an important place as a preliminary sizing or scalping machine, its use alone for complete sizing, according to the speaker, is subject to distinct disadvantages. These are: (1) headroom required; (2) difficulty of changing size of product; (3) troubles caused by changes in coefficient of friction between screen and material; (4) breakage of products and (5) inexact sizing or low efficiency.

Revolving screens, declared Mr. Williams, have "been given a back seat by more efficient and practical machines." Although the shaking screen represents a distinct advance over the revolving screen, it has some of the latter's inherent defects. With single decks for multiple sizing, the smaller openings must be located toward the feed end and the largest sizing must be done near the discharge end. This allows the larger pieces of material to remain on the bed throughout the entire screening of the smaller sizes, interferes with the smaller particles and lowers the screening efficiency—i.e., efficiency of separation.

Angle of inclination, length of throw, revolutions per minute of the eccentric, size of apertures and direction of motion are important in considering shaker screens. The differential in efficiency between shaker and vibrating screens is less when separating the larger sizes than when screening the smaller sizes. To operate at its best efficiency, friction between material and screening medium must be held to a minimum with shaker screens. Vibrating screens operate at high speeds—up to and including 3,600 vibrations per minute. The amount of throw or amplitude sometimes varies up to as much as ¾-in. Speed and amplitude are very important in adapting this screen to any particular application.

Maintenance and lost time with cable-reel gathering locomotives have been cut in recent years, explained G. H. Shapter, Erie Works, General Electric Co., by the introduction of a gearless motor drive and the method of adjusting the tension in the cable. The gearless drive eliminates "the troublesome gear and pinion" and "a great quantity of oil and muck." Cable is now adjusted for a low and a high value by the controller or a resistance commutating switch. In unwinding, the stress in the cable need be sufficient only to allow it to settle on the ground without kinking; in rewinding, the tension is increased so that the cable will not be loose on the ground where it can be run over and damaged by the locomotive.

Lower Maintenance

General adoption of "heatproof" insulation for wires used in winding armatures and of anti-friction bearings has increased efficiency and economy. The greatest improvement, in Mr. Shapter's opinion, is the grease-sealed axle bearing. One Eastern producer triple-shifting 20 gathering locomotives equipped with this bearing construction has operated this equipment without a single replacement of linings or mechanical breakage of gears or pinions in three years. Elimination of dirt, of course, "is the secret of this successful performance."

Series-parallel control theoretically protects the motor equipment from severe overload and abuse in starting. This advantage, however, usually is nullified by braking to prevent wheel slippage. With heavy loads, inability to start often has required more time and resulted in greater abuse than if the motors were actually allowed to overload. Change from series-parallel to parallel control enabled one large company to start heavier loads in substantially less time because wheel slippage was eliminated. But

First Shipment of Illinois Coal to Lakes Via Chicago Docks Under New Rate

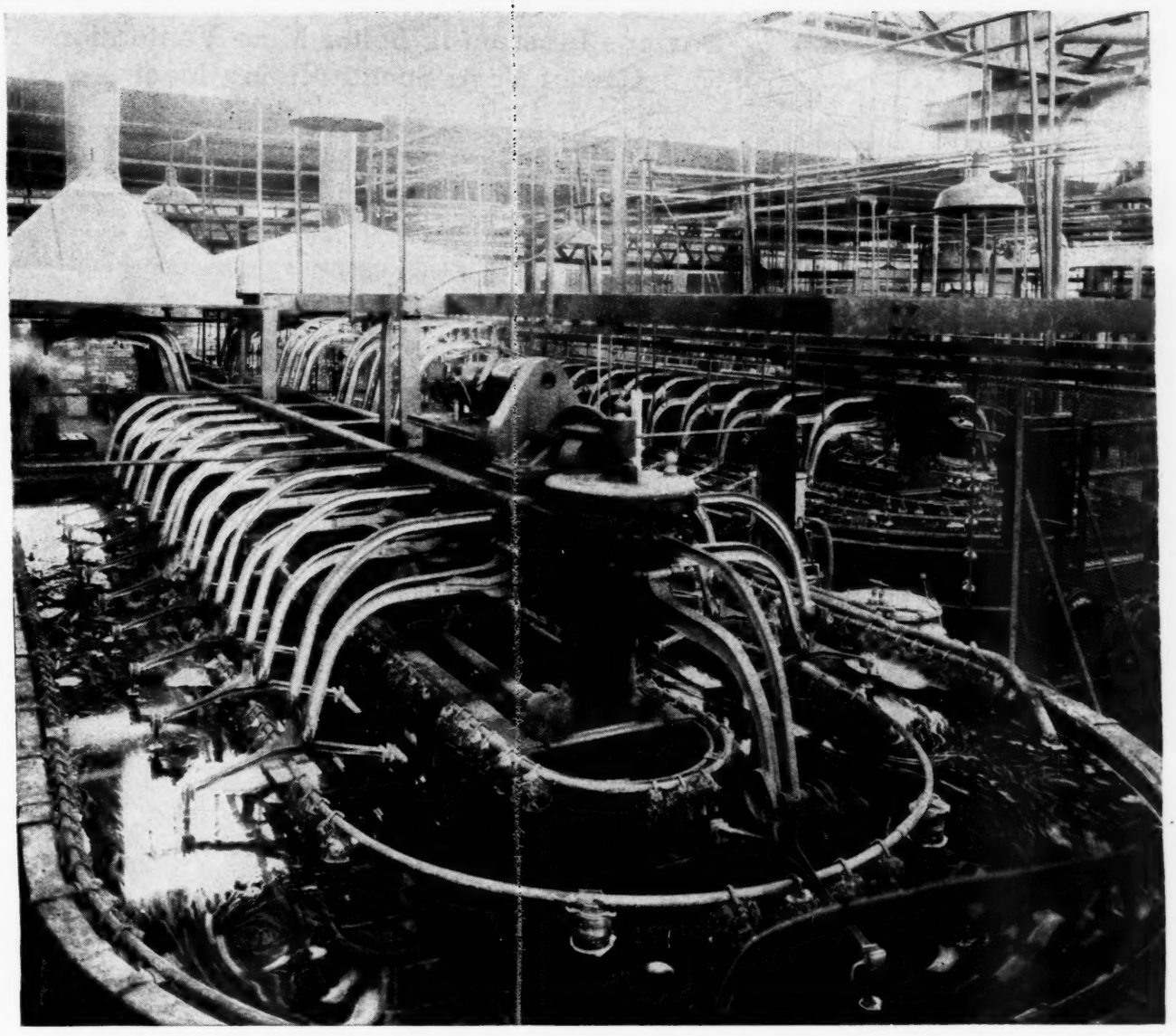
This 20-car train of stoker coal from Old Ben No. 14 mine, Christopher, Ill., was the first coal to be shipped from Egypt, under the new $1.65 rate, for transfer to lake barges to be delivered to lake ports. This was mined June 24 and shipped June 25, destined for Green Bay, Wis.

Institute Who's Who

W. N. Wetzel, general superintendent, U. S. Fuel Co., Hiawatha, Utah, was elected president of the Rocky Mountain Coal Mining Institute at its June meeting. He succeeds Chris M. Shott, general superintendent, Sheridan-Wyoming Coal Co., Monarch, Wyo. F. W. Whiteside, consulting engineer, Denver, Colo., was reelected secretary-treasurer.

Alex C. Burt, mine superintendent, Colorado-Utah Coal Co., Mt. Harris, Colo.; Clarence E. Uhland, assistant general manager, Gallup-American Fuel Co., Gamerco, N. M.; W. D. Bryson, general superintendent, Utah Fuel Co., Castle Gate, Utah, and R. P. Hogan, mining engineer, Colony Coal Co., Rock Springs, Wyo., were chosen vice presidents.

The personnel of the new executive board is: Alex Grant, Coal Mine Management, Inc., Denver; G. R. Harris, general manager, Hayden Coal Co., Denver; Allan French, general manager, St. Louis, Rocky Mountain & Pacific Coal Co., Raton, N. M.; Oscar Huber, president, Albuquerque & Cerillos Coal Co., Madrid, N. M.; L. E. Brown, Westinghouse Electric & Manufacturing Co., Salt Lake City, Utah; Walter Cochrane, general superintendent, Spring Canyon Coal Co., Spring Canyon, Utah; Hodge Burress, unit foreman, Union Pacific Coal Co., Superior, Wyo.; and Ray M. Bottomley, mining engineer, Sheridan-Wyoming Coal Co., Monarch.



It puts copper underwear on electric irons

A typical example of Goodrich development in rubber

ELECTRIC irons wear a thin dress of chromium as transparent as a chorus girl's costume. What provides the real shine and permanence is the bright nickel beneath. But nickel is expensive, a vital defense material and is becoming hard to get.

Manufacturers knew they'd need less nickel if they started with an under-layer of copper. But the copper has to be bright to get bright nickel. Both nickel and copper plating is done in huge tanks like the one pictured. To prevent danger of leaking electrical currents, tanks were lined with rubber. But the chemicals used in plating attacked those used in compounding rubber, and this "chemical warfare" spoiled the brightness of the metal.

B. F. Goodrich engineers had to find an entirely new way to compound rubber — with chemicals that would not be affected. It was almost as hard as being told to make bread without yeast or baking powder.

After hundreds of experiments, with chemicals that tradition said were hopeless, the Goodrich engineers found the answer.

Scores of tanks like the one in the picture have since been lined with this new kind of rubber. Nickel is conserved, production speed increased, costs are cut — all because B. F. Goodrich engineers have years of research experience behind them which they can apply to any rubber problem you may give them. *The B. F. Goodrich Company, Mechanical Goods Division, Akron, Ohio.*

B.F. Goodrich

First IN RUBBER

(Another story of Goodrich development work appears on page 1)

there must be good voltage at the starting point and this means proper and sufficient trolley wire and feeder and good rail bonding.

High praise was given the work of the Bureau of Mines in testing explosives by C. L. Barker, technical representative, E. I. du Pont de Nemours & Co. Where the minimum velocity was once 7,500 ft. per second, satisfactory results are now obtained with a velocity of 5,000 ft. This, he predicted, would be still further reduced. He urged all mines to observe the Bureau rules for safe blasting, to select the proper explosive and cut the places properly. Correctly used permissible dynamites, continued Mr. Barker, will cause a minimum of roof disturbance. Experiments are under way with the use of a patented dummy for air spacing and with rock wool for tamping. Possibilities of breaking down coal with hydraulic pressure (*Coal Age*, April, 1940, p. 67) are proving very encouraging.

The time to consider immediate and future power requirements is when laying out the mine, asserted James W. Hart, power department, Public Service Co. of Colorado, in a brief extemporaneous review of electrical fundamentals in coal mining. Smaller wires on branch lines will not carry the same load as big wires, so install circuit breakers or disconnect switches. Transformers are limited in the work they can do. Lightning arresters and reclosing mechanisms should be provided. Limiters can put down peak demands. With sumps, Mr. Hart recommended large pumps to operate only on off-peak periods; if continuous operating is necessary, a small pump was the answer. Nobody really profits from power wastes. The more instruments for measuring demand, voltage and general efficiency of the power-distribution system a mine has the better off it will be from a cost standpoint.

Native life and mining scenes in South Africa were shown in a movie by H. F. McFarland, mining engineer. Other film presentations were "The Making and Shaping of Steel" (Carnegie-Illinois Steel Co.) and "Sinews of Steel" (Bethlehem Steel Co.).

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Long Idle Island Creek Mines To Be Reopened

Mines Nos. 15 and 16 of the Island Creek Coal Co., Verdunville, W. Va., which have been largely idle for the last five years, are to be reopened soon. Having a combined capacity of 50 to 60 thousand tons a month, they are expected to be in production again some time during August. Shut down because of limited markets, the workings have been kept in good condition.

•

Engineering Index Ready

The 56th annual volume of the Engineering Index is now ready for delivery. The book contains about 26,000 annotations of important articles that have appeared in domestic and foreign current technical periodicals, and there are nearly 40,000 cross references to these annotations. The authors' and contributors' index includes some 19,000 names.

Savings Inherent in Better Mine Ventilation Gist of Nova Scotia Mining Meet

IN NOVA SCOTIA, as in the United States, the staffs of mining companies are giving intensive study to the dollars lost, and the dangers resulting, from poorly planned ventilation systems. Ventilation, accordingly, was the key subject of the coal section of the 54th annual meeting of the Mining Society of Nova Scotia, held June 24-25 at Pictou Lodge, Pictou, N. S. Other papers covered fire protection and geology.

Not on the prearranged program, but a major consideration nevertheless, was the matter of defense. Canadians have discovered that many industries, particularly coal mining, have shops in which building space is sparsely employed and machines are used only about a few hours in a single shift, whereas these shops could be filling a full 24-hour shift and using the machines in making material for war in the remaining hours during which the machines are now idle. Mining officials are taking more than a kindly interest in this proposition, and welcome the opportunity presented as a means of doing their bit.

If they should be asked to surrender the machines to some factory specializing in defense work because that establishment would use them more hours in the day, their mining operations would be brought eventually to a complete standstill, whereas the machines, if used in their spare time for making aeroplane and other parts, it was said, would serve to best advantage both the mining and the defense interests. The shops also, by reason of their small size and isolation, would be less subject to bombing than bigger factories.

After all, though the machines may not be of the newest and best type and may not be specifically built for the job they have to perform, the mechanics that use them, having had to learn how to improvise and find new ways of doing all kinds of jobs with the machinery available, are often better workmen than "machine butchers" who have been continuously at one job and that job so prescribed and repetitive that they have had little occasion to mingle headwork with muscle.

Mechanics Training

In the paper-and-pulp industry, to which this notion has been applied, such machine tools have done work superior to that done by newer and one-purpose equipment, with results well within the required tolerances and in shorter time than had been expected. Moreover, it was stated that these all-purpose mechanics had devised new ways of doing old jobs, and so revolutionized practice in some of the larger shops. Ottawa officials are not crowding the operators, nor are they demanding a place of leadership but feel decentralized effort more suited to a democratic people and more likely to bring the best results, especially as Ottawa is not staffed for such direction.

Ottawa believes also that the machines could be used for the training of mechanics. Canadian mining men were asked to let those who have been "graduated" in their shops be promoted to supervisional and instructional jobs in the defense industry, replacing them by the talent developed in men who have been hired and trained, meantime, to take their place in the mine shop.

Fan design, asserted Angus McDowell, speaking for Louis Frost, development engineer, Dominion Coal Co., Sydney, N. S., is an exact science, but it would be, perhaps, somewhat incorrect to place practical mine ventilation in that category. The manager usually has to face the difficulty that the mine has not been designed for its ventila-

Keeping Step With Coal Demand

Bituminous Coal Stocks

	Thousands Net Tons June 1 1941	P. C. Change From May 1 1941	P. C. Change From June 1 1940
Electric power utilities	9,204	+2.108	— 6.062
Byproduct coke ovens	4,725	—4.929	—20.668
Steel and rolling mills	737	+2.219	+38.274
Railroads (Class 1)	6,129	+8.324	+33.181
Other industrials*	11,996	+4,059	+ 4.186
Total	32,791	+2.822	+ 1.197

Bituminous Coal Consumption

	Thousands Net Tons May 1941	P. C. Change From April 1941	P. C. Change From May 1940
Electric power utilities	5,301	+27.305	+43.425
Byproduct coke ovens	6,871	+ 7.292	+14.516
Steel and rolling mills	837	—11.522	+11.451
Railroads (Class 1)	7,756	+10.705	+17.175
Other industrials*	10,820	+ 3.018	+23.516
Total	31,585	+ 8.827	+22.703

* Includes beehive ovens, coal-gas retorts and cement mills.

Coal Production

Bituminous

Month of June, 1941, net tons	43,090,000
P. c. inc. over June, 1940	32.994
January-June, 1941, net tons	226,226,000
P. c. inc. over Jan.-June, 1940	3.025

Anthracite

Month of June, 1941, net tons	4,886,000
P. c. inc. over June, 1940	8.771
January-June, 1941, net tons	25,946,000
P. c. inc. over Jan.-June, 1940	0.851

Sales of Domestic Coal Stokers Vs. Oil Burners

Sales	Coal Stokers	Oil Burners
May, 1941	14,137	19,028
P. c. inc. over May, 1940	71.233	17.341
Jan.-May, 1941	43,044	68,945
P. c. inc. over Jan.-May, 1940	60.984	33.129

Index of Business Activity★

Latest week	159.1
Per cent change from month ago	+ 4.739
Per cent change from year ago	+ 24.000

★ *Business Week*, July 19.

Electrical Power Output†

Week ended July 12, kw.-hr.	3,141,158,000
Per cent change from month ago	+ 2.446
Per cent change from year ago	+18.5

† Edison Electric Institute.

Enterprise CARS HAVE INBUILT STRENGTH AND SIMPLICITY

If you want the best car *service*, your mine cars MUST be built —first, to your individual specific requirements—second, to stand up on the job under tough conditions, and third to be simple, hence inexpensive, in repairs and maintenance. This is the 3-way advantage you get when you use Enterprise Cars —the triple reason why you get maximum mine car capacity, lowest car operating cost, more actual operating hours, and greatest tonnage hauled for least investment.

ENTERPRISE
WHEEL & CAR CORPORATION
BRISTOL, VA.—TENN. HUNTINGTON, W. VA.

tion, so ventilation has to be designed to fit the mine.

By minor changes, prudent managers will endeavor to keep the methane content of the mine air down to 1 or 1½ per cent, even close to the working face and on the return side of each split, and to that end the Dominion Coal Co. has made it a practice to make a ventilation survey whenever the limit of 1½ per cent methane is exceeded. The British Royal Commission on Coal Mines, 1938, also recommended that the inspector be permitted to require that such a survey be made where that methane percentage is found.

Air Surveys Essential

Air surveys, declared Mr. McDowell, fall into two classes: (1) They may be made with a water gage and anemometer, or (2) with an aneroid or other total-pressure measuring instrument whereby the ventilation pressures in the mine or a section of the mine can be completely analyzed. But, because of the extreme accuracy needed in the pressure determinations, this second, or aneroid, system involves great care and much work. The first method, though a ready means of determining the relative conditions of the airways and splits in the mine, cannot give the more detailed and exact results afforded by the second.

However, a simple survey with water gage and anemometer will give the mine manager an immediate picture of the relative condition of the ventilating system and will clearly indicate where it will be profitable to increase any cross-sectional areas so as to supply more air to any particular split and also will point to any bottlenecks within the split that are retarding the flow of the ventilating current. In longwall mining, bottlenecks are frequent. Some of these occur at the point of entry to the longwall face, but more frequently the greatest obstruction occurs in the so-called "cundies," or crosscuts, on the return side of the walls.

One cundy at the return end of a ventilation district was carrying 30,000 c.f.m. and the pressure drop between the intake and return side of the crosscut was 0.70 in. water gage, equivalent to 3.6 air horsepower. As the over-all efficiency of the fan at this colliery was 50 per cent, the actual loss at this point alone was 7.2 hp., or, at 1c. per kilowatt hour, $480 per annum. Crosscuts of this type usually are from 50 to 100 ft. long. Therefore, the expenditure of a few dollars to maintain or restore a reasonable cross-sectional area is a worth-while economy.

In many old mines, the leakage loss is 60 to 70 per cent of the total quantity of air the mine receives, a most serious waste of the money the mine is investing in power. No more than 30 per cent of the air should ever be lost in leakage. Usually, however, a mine manager does not become leak-conscious until the ventilation is no longer effective, for the ventilation power cost is a charge which he never thinks of questioning.

Splitting has long been recognized as a means of maintaining low-cost ventilation, but it must not be done to such a degree that the velocity of the air will be so low that it will not turn the blades of an anemometer. On the other hand, the velocity of the air on a longwall face should not exceed 800 ft. per minute because, with such a speed, so much coal dust will be thrown into suspension that mining will be hazardous. High velocities also make it necessary to use protective goggles for the eyes, which at best impair the vision of the workman, declared Mr. McDowell.

Where entries are long and of limited cross-sectional area, the fan pressure may have to be increased, but the practical upper limit for water gage is about 10 in., and this may be excessive if normal leakage is high, for the gain in quantity of air circulated may be small as compared with the increased power expended. Moreover, a much lower pressure may be necessary when the coal seam is subject to spontaneous combustion. Pressures higher than 10-in. water gage have been recorded, mainly on the continent of Europe, where water gages as high as 13.5 in. have been used.

Only under unusual circumstances can the installation of a booster be justified. However, it may so assist in the ventilation of a district inadequately ventilated that it will save several years of constructional work. When a booster is installed, it substantially reduces the pressure needed between it and the fan at the surface, and thus reduces leakage loss and lowers the pressure needed in the mine.

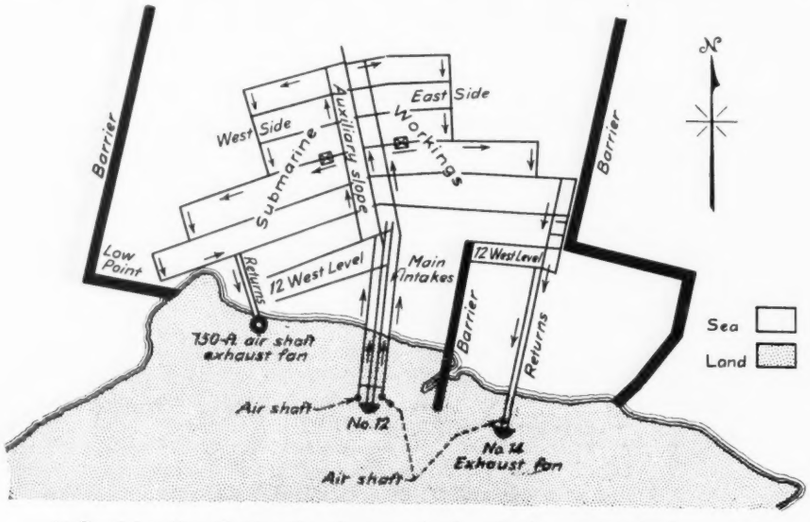
In 1936, it was found necessary to increase the quantity of air entering the Caledonia mine of the Dominion Coal Co. from 74,000 c.f.m. at 5.4-in. water gage to 94,000 c.f.m., which under existing conditions would have made necessary a pressure of 8.7 in. As the airways pass through a crushed area near the main shaft, such an increase in ventilating pressure would have caused serious leakage losses. Because of the delay which would have been necessary to enlarge the airway and the difficulty of supporting it when enlarged, its reconstruction was not considered feasible, so a booster fan was installed 7,600 ft. from the intake shaft. This unit produced 78,000 c.f.m. with a water gage of 4.6 in., as against the 46,000 c.f.m. at this point prior to its installation. The surface water gage remained at 5.4 in. and the total quantity of air was increased to 94,000 c.f.m. As the pressure was not increased, the leakage remained constant.

Where additional outlets can be sunk to the seams at points remote from the intakes, the travel of the air can be shortened, and fans can be run in parallel so as to keep the water gage within reasonable operating limits, as shown in the line drawing of Dominion No. 12 mine. With this arrangement of the fans, intake facilities were doubled, and the travel of the air was reduced by nearly three miles, thus saving about 100 air horsepower, or a power charge of $6,500 annually.

Take Measurement Accurately

When selecting a fan to replace an old one, the resistance that the mine will develop in passing the desired quantity of air can be calculated from tests made with the old unit, but quantity and pressure measurements must be taken accurately, and both the temperature of the air and the height of the barometer should be ascertained, declared William D. Sheldon Jr., chief engineer, Sheldons, Ltd. The quantity of air passing should be measured at a point where the airway is of uniform cross-section and where air velocities are reasonably uniform, and, if such a location is not convenient or available, a 10- to 15-ft. section of the airway should be lined smoothly with boards to form a measuring station.

For measurement of air velocities from 150 to 2,000 ft. per minute, the anemometer will give reasonably accurate results and is to be preferred to other instruments. For velocities of 2,000 ft. per minute and higher, the pitot tube and manometer are more accurate and therefore should have preference.



At Dominion No. 12 mine the air enters by four intakes, scours the faces, and comes out by four returns drawn by two fans operating in parallel.

Council for 1941-1942

Garfield G. Bowser, manager, Canadian Industries, Ltd., Halifax, president; W. S. Wilson, chief engineer, Dominion Steel & Coal Corporation, Sydney, first vice president; Dr. Alan E. Cameron, Deputy Minister of Mines, Halifax, second vice president; S. C. Mifflen, office engineer, Dominion Coal Co., Sydney, secretary-treasurer.

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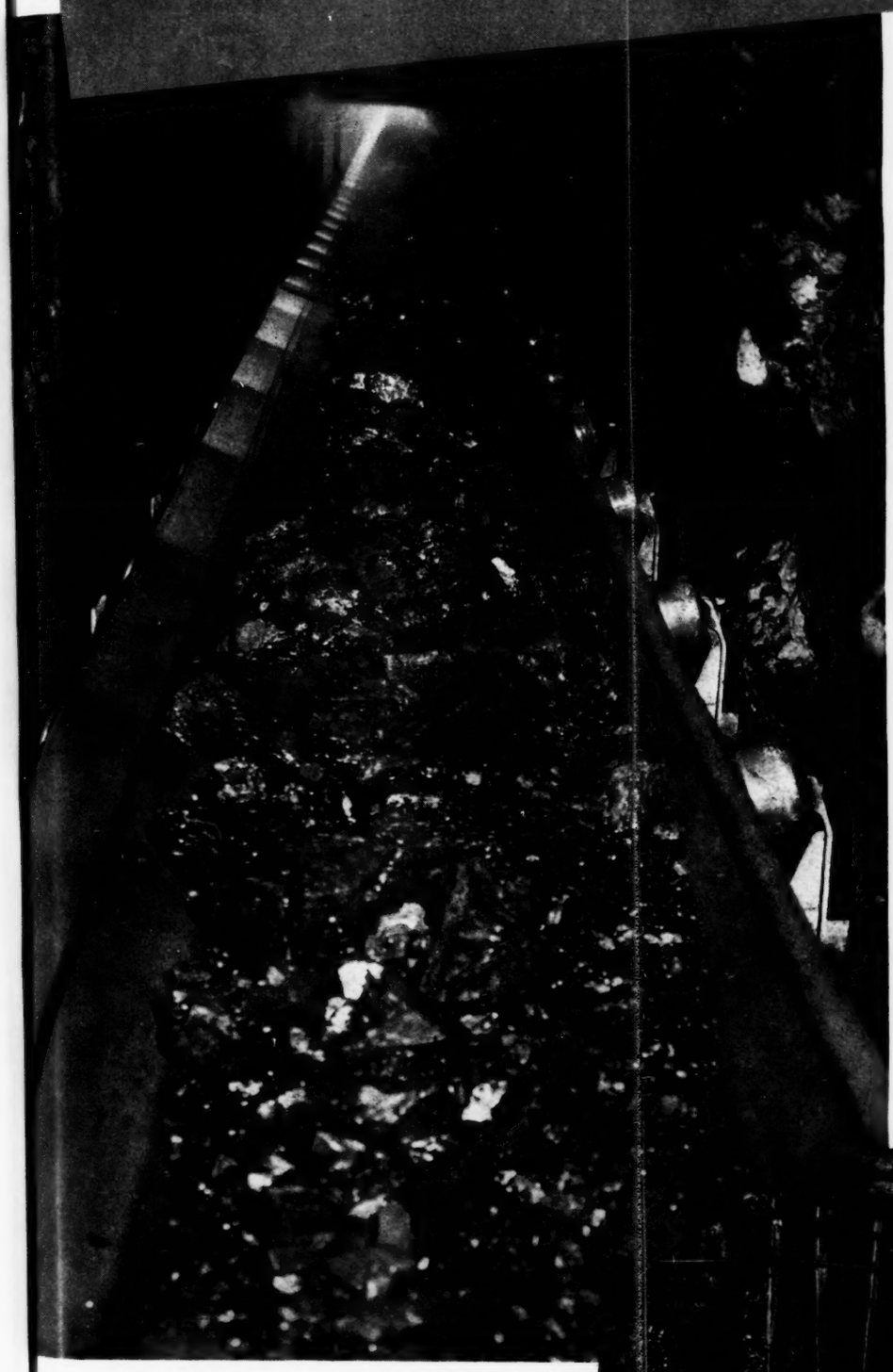
SPEEDING COAL UP CHERRY HILL

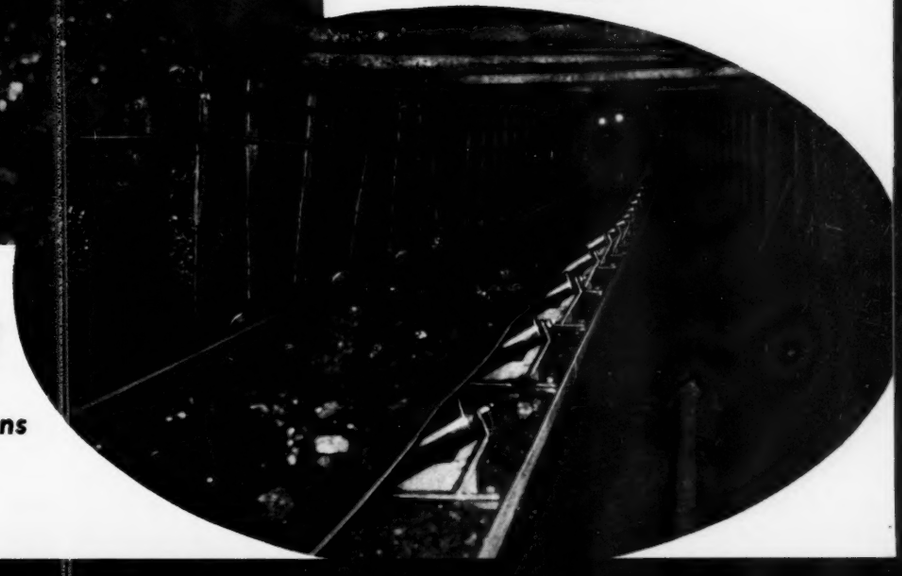


...these husky, tailor-made Conveyor Belts help keep Louisville's lights ablaze... industries a-rolling.

FROM THE DEPTHS OF THE CHERRY HILL MINE, near Central City, Kentucky, comes the constant flow of coal that keeps the Louisville Gas and Electric Company plant operating twenty-four hours every day.

Two belts are assigned to this vital job, and, although installed by two different equipment manufacturers, both belts were tailor-made by U. S. Rubber. The slope belt is 36 in. wide x 6 ply, 42-ounce duck; 3/16-in. top cover with white cushion Leno breaker, 1/32-in. bottom. Operating on 900-ft. centers at 300 ft. per minute up a 17-degree incline, this belt handles the entire output of the mine.

The "mother" (shown below) required 1,230 ft. of 30-in. x 5 ply, U. S. Conveyor belting, 1/8-in. top cover with breaker strip, 1/32-in. bottom. U. S. Rubber Engineers will be glad to consult with you on *your* conveyor belt problems.



United States Rubber Company

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Service Beyond Price and Specifications

Where, Mr. Sheldon added, the quantity of the air to be passed by the new installation is not more than 20 per cent greater than that of the old one, the mine resistance can be assumed to increase as the square of the quantity of air being passed. Tests in several mines indicate that the actual increase varies between the 1.5 and 2.0 power of the quantity; but only with difficulty can the pressure be measured because of variations in natural draft, leakage, and other modifying conditions.

Calculating Resistance

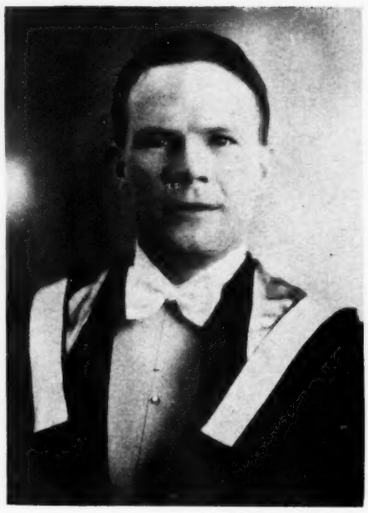
Where the new fan is to deliver more air than the fan it displaces, the anticipated resistance can be calculated as proportional to somewhere between the 1.6 and 1.9 power of the quantity passed. For this range, the mine resistance can be calculated, and a fan can be selected that will operate at great efficiency under any resistance condition within it. To insure long service at high efficiency, the anticipated minimum and maximum pressure that will be needed to overcome mine resistance should be specified, so that, for all resistances thus likely to be encountered, a fan can be selected that will operate within the high-efficiency portion of that unit's performance curve.

The multiblade centrifugal fan with blades curving forward gives a comparatively constant pressure even when the volume of air delivered changes markedly, but the horsepower required rises rapidly with increased capacity, a feature that makes the fan undesirable, where resistance pressure is varied due to changes in natural draft, etc., as frequently occurs when these fans are used for ventilating a mine. This type of fan, however, has some good points and these may fit some applications: (1) It has low peripheral speed for a given pressure; (2) takes small space for any given capacity, and (3) can be installed for a low first cost.

Multibladed centrifugal fans with radial tip blades have performance characteristics between those of the multiblade fan with forward-curving blades and those of the multiblade fan with backward-curving blades. Horsepower still increases with capacity but not as rapidly as it does with the forward-curved type. When fitted with suitable inlet vanes, the performance characteristic of this multiblade centrifugal fan with radial-tip blades is similar to that of the multiblade fan with backwardly curved blades.

Multiblade Performances

The multiblade centrifugal fan with backwardly curved blades is frequently termed a high-speed fan, because at comparable points of operation for a given air delivery and pressure, it must be revolved at a somewhat higher speed than a fan with forward-curving blades. To meet the varying or unpredictable resistances of mine ventilation, this type of fan has the following advantages: (1) An efficiency little affected by the volume of air the mine conditions permit the fan to deliver at a given pressure. (2) A sloping pressure characteristic that enables the fan to care for a wide range of mine resistance or specific capacity without losing its high efficiency [the greater the volume of air passed by the fan due to a reduced mine resistance the lower the pressure needed for such passage]. (3) A speed that enables the fan to be connected direct to the less expensive, higher speed alternating-current motors. (4) An almost constant horsepower over normal operating ranges, which is a desirable condition for motor drive and avoids the danger of motor overload when operating under widely varying mine resistances. To make this type of fan suitable for the higher peripheral speeds required for pressures above 6-in. water gage, the width of the impeller and housing are narrowed; higher efficiencies usually are obtained with fans of narrower width for the higher pressure but at a sacrifice in volumetric capacity.



Lester J. Archibald

First to receive a Nova Scotia Mining Society's scholarship at Nova Scotia Technical College.

Axial-flow fans are available with several types of impellers and such fans accordingly give different volumes of air with the same expenditures of energy. With diffuser vanes such a fan has performance characteristics similar to those of the backward-bladed centrifugal fan and has also all its advantages except that a higher peripheral speed is needed for a given pressure. Moreover, it has the advantage that its power is practically constant or tends to increase with reduced air delivery due to increased resistance—that is, in the opposite direction to the forward-bladed centrifugal fan.

Advantages and Disadvantages

Other advantages of this type of fan are: (1) High efficiency, sometimes reaching 85 per cent for total efficiency and 75 per cent for static efficiency; (2) ease of reversibility in emergencies, for air flow can be reversed merely by changing the direction of rotation. Bulky reversing dampers, so necessary with a centrifugal fan are not required.

Disadvantages of this type of fan are: (1) More noise than with a centrifugal fan for comparable performance, but this objection can be largely eliminated by use of a two-stage fan; (2) limitation in its usual design to a maximum pressure of about 4 in. of water gage with a single-stage and 8 in. with a two-stage fan.

Propeller fans or axial-flow fans without diffuser vanes can be obtained with many types of impeller and widely varying performance characteristics. They are advantageous for handling large volumes of air at relatively low pressures up to about 1½-in. water gage, and for this their principal advantage is low first cost. Though their total efficiency may be high, the static efficiency usually is low, because of the high outlet velocity pressure.

Anticipating Maximum Demands

Fans should be strong enough in fan-wheel shaft and bearings that they can be run safely at speeds that may later be required. This is particularly important where pressures in excess of 6 in. of water gage become necessary. Maximum fan speed should not exceed 70 per cent of the critical speed or resonant vibration period of the shaft. Large centrifugal fans for pressures exceeding 5-in. water gage should be provided with an évasé so that the velocity pressure at the outlet will not exceed 4 per cent of the rated static pressure. This rule also applies to large centrifugal fans with reversing dampers. The included angle of divergence of the évasé should be 14 deg. or slightly less, and the velocity pressure of the air flowing through the side drifts of a fan with reversing dampers should not exceed 3 per cent of the static pressure.

Fan bearings should have oil seals that would prevent oil from being drawn out of the bearing by the high velocity of the air over them. Grease-lubricated anti-friction bearings of the self-aligning ball or roller types are favored, for when properly installed, they require little attention for lubrication or maintenance.

In written discussion, Mr. Frost declared that in some mines natural ventilation greatly supplemented the operation of the fan. Robert Clive, he added, was reported in the transactions of the Institution of Mining Engineers, London, England, as saying that the natural ventilation at Bentley colliery acting alone equalled two-thirds of the total ventilation produced by the fan.

Canada suffers a direct loss of $80,000 a day from fires, about one-third of that loss being in dwellings, asserted W. H. Graham, insurance and title records department, Dominion Steel & Coal Corporation, Sydney. Nova Scotia's share is $4,133 daily. More than 75 per cent of all fires are from lack of ordinary care. When losses exceed 60 per cent of premiums, the latter have to be increased, as about 40 per cent is required to cover underwriting, inspection, bookkeeping, exchange, etc. The best protection is a fire-resisting structure. Frame buildings should be fitted with a sprinkler system. Next in importance is plant order and cleanliness.

Scholarship Conferred

It was announced at the meeting that in the course of the year a committee of the society conferred a scholarship at the Nova Scotia Technical College, Halifax, on Lester J. Archibald, of that city, whose studies are directed to mining engineering. Speakers at the banquet were L. D. Currie, Minister of Mines, Nova Scotia; R. Dawson Hall, representing the president of the American Institute of Mining and Metallurgical Engineers; L. McGregor Stewart, Coal Administrator; and Prof. Wilbur G. MacBride, president, Canadian Institute of Mining and Metallurgy. At the luncheon Dr. F. H. Sexton, president, Nova Scotia Technical College, was the sole speaker.

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A.I.M.E. Central Section and Coal Division At White Sulphur Discuss Fuels Shortage

COALS stepping up into next higher grades, a gas shortage in the Appalachian fields in spite of new storage methods, coal assuming more of the fuel load, transportation adequate except in certain districts—that was the composite picture painted by open discussion on "Fuels Emergency" at a meeting of the Coal Division and Central Appalachian Section, American Institute of Mining and Metallurgical Engineers held June 26–28 at the Greenbrier Hotel, White Sulphur Springs, W. Va. It was the first meeting of the newly established Central Appalachian Section, of which Veleair C. Smith, consulting engineer, Charleston, is chairman. Vice chairmen are L. I. Cothern, head of the mining department, Virginia Polytechnic Institute; A. R. Matthews, general superintendent, Clover Splint Coal Co., and R. H. Morris, general manager, Gauley Mountain Coal Co. D. L. McElroy, professor of mining, West Virginia University, is secretary.

Four of the six papers presented at the other two sessions were of direct interest to coal operators. Discussion of a fifth paper, dealing with a theoretical recovery of residual oil from depleted fields, elicited a statement by Mr. Smith that the gases proposed as agents for that recovery would be made from coal.

The sixth paper described minable and working deposits of manganese ore in Virginia and West Virginia. In-the-mine tests of the crushing strength of coal pillars, hydraulic brakes for mine locomotives, smoke abatement and surface-preparation restrictions to mechanical mining were the "strictly coal" subjects.

Germany is now definitely limited by fuel and our problem is getting fuels to various industries, commented Mr. Smith, who, with Lee M. Morris, professor of mining and geology, West Virginia Institute of Technology, opened the forum on "Ways and Means of Meeting the Increased Demand for Fuels During the Emergency." Mr. Smith foresees that by next winter the industry must furnish an extra million tons of coal per week to Eastern ports and he questions the adequacy of transportation facilities to handle that increase.

Facilities Are Overtaxed

A shortage of bunker coal is in the offing and right now storage facilities and mechanical equipment for handling that coal are overtaxed. Tremendous increases in the truck movement of coal, the Great Lakes region included, will help the transportation situation, but, Mr. Smith continued, "John Public should be persuaded to buy now and the retail yards encouraged to build up stocks so the coal can be moved now." Calling attention to necessity for natural gas in making low-phosphorous steels for defense, he predicted that "before long" mixed gases will come into use.

Opinion that the necessary coal will be produced but that shortages will result from lack of transportation was expressed by E. B. Agee, manager of coal mines, Youngstown Sheet & Tube Co. As regards the demand for metallurgical coke, he said that every Tom, Dick and Harry is opening beehive coke ovens.

That a shortage of metallurgical coke is becoming a real bottleneck was expressed by J. E. Tobey, vice president, Appalachian Coals. He predicted that all coals will move upward to uses formerly served by higher grades. Byproduct plants which since the last world war have been built on inland waterways, according to his thought, should have an effect in preventing congestion of railway transportation.

In a prepared discussion, D. P. Morton, chief rating commissioner, Chesapeake & Ohio Ry., expressed the opinion that there is no danger of a general breakdown of transportation service, but, in reply to questions, admitted that only the utmost cooperation of all can avert congestions in certain districts of concentrated defense activity.

Although increases to date point to a revenue loading exceeding 950,000 cars per week by this autumn, Mr. Morton pointed out that the American railroads handled a peak load of 1,200,000 cars per week in 1929. Not within three years does he expect a 52,000,000-cars-per-year rate. Of the total revenue freight of Class 1 railroads, coal and coke makes up only 20 per cent. At present in the Appalachian section of this country all available freight cars are in service. Moving coal to supply all byproduct plants to capacity and fostering additional byproduct plants instead of coking at the mine and having to transport the coke, which is of much greater volume, was suggested as a defense transportation move.

Quoting Ralph Budd, Advisory Commission, Council of National Defense, Mr. Morton listed five ways for shippers to cooperate in securing uninterrupted railway transportation:

1. Give advance notice of requirements, but do not order cars placed until commodities are ready to load.
2. Unload cars promptly on arrival and notify the railroad when an empty car is available.
3. Load cars to maximum journal-carrying capacity or full visible capacity, whichever governs.
4. Remove all dunnage, blocking and rubbish from cars after unloading to permit immediate reuse and eliminate necessity for delay to cars for reconditioning.
5. In industries where a five-day week is in effect, some plan should be worked out to provide at least a six-day basis for loading and unloading cars.

Speaking personally, Mr. Morton added the following suggestions: (1) Reduction in number of sizes made at some mines or the increased use of bins for extra sizes to reduce part loads; (2) use every precaution to avoid damage to open-top cars unloaded by clamshells; (3) route cars to destination via the way insuring quickest delivery and return of the empty.

Coal Is Essential

Coal belongs in the status of an essential industry, declared W. E. E. Koepler, secretary, Pocahontas Operators' Association. At present difficulty is encountered in hurdling the red tape to prove that a certain coal or quantity is going to a defense industry and thus obtaining priority on equipment. He cannot see that oil shortages promise to be so severe as to justify the start of construction of long pipe lines which take years to build, but wonders why railroads have not used their rights-of-way for pipe lines.

George S. Rice, retired former chief mining engineer, Bureau of Mines, called attention to what he himself termed his Utopian approach toward conservation and

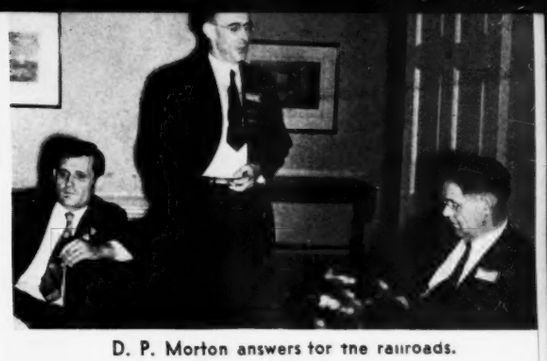
Advanced Training Course for Illinois Mine Examiners

Alex U. Miller and P. P. Senio, U. S. Bureau of Mines, Vincennes (Ind.) office, with the help of Walter Anderson, Benton (Ill.) mine rescue station, and W. O. Williams, Springfield (Ill.) mine rescue station, have just conducted a special examiners' school for newly appointed Illinois mine examiners. Conducted with the cooperation of the Bell & Zoller Coal & Mining Co., at its No. 2 mine, Zeigler, Ill., the course was attended by 16 new appointees to the examining staff, Department of Mines and Minerals. Beginning at top, left to right: Frank Stank, Joe Harris, E. S. Wright, Charles Blaheny, Elmer Edmonds, Robert Weir, Alex Miller, Driscolo Scanlin, Fred Saurs, George Hall, John V. Oldani, George Bagwell, Fred Lippert, W. L. Morgan, W. O. Williams, P. P. Senio, R. R. Schiber, Robert Taggart, Walter Anderson and Charles Van Schaick.

A.I.M.E. AT WHITE SULPHUR

H. P. Greenwald—testing pillars.

Carl Scholz—fought smoke in Chicago in 1916.



D. P. Morton answers for the railroads.

Veleair C. Smith opens. Lee Morris, vice chairman.

Fred Toothman—West Virginia trends.

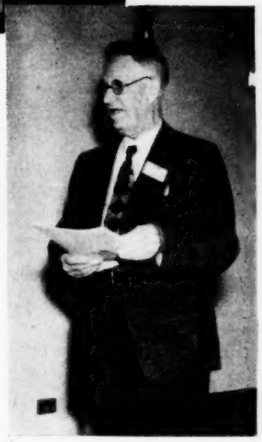
G. R. Spindler pinch-hits.

Geo. S. Rice brings up conservation.

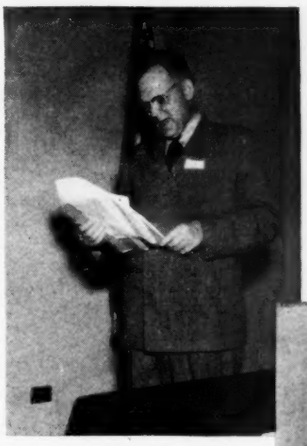
Wm. Christy—less smoke in New Jersey.

J. E. Tobey opens a session. L. I. Cothern (left), vice chairman.

J. E. Tobey—metallurgical coke is bottleneck.



R. J. Holden—manganese in Virginia.

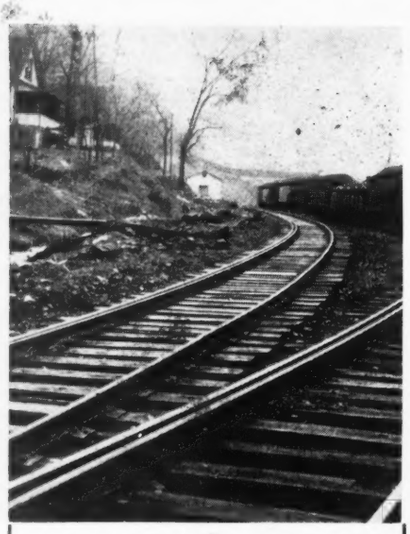


H. J. Wasson briefs Pirson's tertiary recovery.

J. F. Robinson describes gas storage.

W. E. E. Koepler—no smoke.

V. D. Hanson—cleaner coal and more refuse.



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dividend paying in the coal industry—a government agency to issue permits for opening new mines only when the necessity is proved. This was tried to some extent during the first world war and in Alaska. That the coal mines of France, so regulated, paid dividends is his argument in its favor.

A definite labor shortage exists in the coal industry and there is need for authorization of more working hours per week so men can make more money and be less tempted to move, stated Carl Scholz, consulting engineer, Charleston.

Gas Consumption Up

Production of natural gas in the Appalachian fields is now about equal to consumption and some steps must be taken to augment the supply, said J. French Robinson, president, East Ohio Gas Co. The year 1940 brought an increase of 17 per cent in consumption over 1939 and so far this year the percentage is running 33⅓ over 1940. Preparations are being made to store gas in the depleted fields of eastern Ohio, as is already being done in many other parts of the country. The start was in 1916 near Buffalo. The East has plenty of depleted fields for storage. Loss by underground storage is practically nil. The problem now is to get the gas to store. Mr. French predicts a time when gas-producer plants will be built at the coal mines and the gas stored in depleted fields.

A glimpse of what will be published within two or three months in a government bulletin on crushing strength of pillars was presented by H. P. Greenwald, superintendent of the U. S. Bureau of Mines, Pittsburgh experiment station. Two other Bureau men, H. C. Howarth and Irving Hartman, aided in preparing the paper. In the Bureau's experimental mine in the Pittsburgh seam, square pillars of side dimensions ranging up to several feet were carved out by hand and tested in place to failure with 500-ton hydraulic jacks. From these tests, for this particular coal, which contains many face cleats, a complicated mathematical formula was devised for calculating strength of larger pillars.

Given time under each increased fixed load, the coal compressed materially. Bulging took place at the center and the beginning of failure was indicated by spalling from the face cleats. Bottom heaving, a difficulty with the first test, was controlled by replacing the fireclay around the pillar with cement. Because of the cleats, the pillar showed much less unit strength than a small block of the coal put under a test machine. The tests indicated definitely that a pillar reduced by splitting has much less strength than a pillar reduced from the outside. The next tests will be on rectangular pillars, some formed with the long sides parallel to the face cleats and others at 90 degrees.

Replying to questions, Mr. Greenwald said that the barodynamic and photoelastic experiments of Prof. Bucky (*Coal Age*, July, 1940, p. 40; November, p. 54) differ in that the materials are homogeneous—that is, without cleats. The experiments, however, are a valuable contribution toward a final solution. The Bureau experiment station contemplates making the same sort of in-place pillar tests in other seams, but, due to the cost and time required, has put aside the idea for the present. Plans are being considered by West Virginia University, said Prof. McElroy to repeat some roof-measurement experiments in a mine now on mechanical loading but which was on hand loading when the first experiments were made.

Joseph Pursglove Jr., general manager, Pursglove Coal Mining Co., called attention to the probability of much different results with pillars that had been subjected to explosives. He said that in pulling pillars in the Pittsburgh seam at Pursglove, W. Va., entirely different results were encountered under sections where squeezes have occurred in old workings of the Sewickley seam 90 ft. above.

Shows No Marked Trend

West Virginia coal production over the 15-year period from 1925 to 1939 has shown no decided trend toward either higher or lower seams, was the conclusion reached by Fred R. Toothman, student, West Virginia University, who briefed a paper he had prepared as an undergraduate thesis and which won for him second award in a contest sponsored by the Central Appalachian section of the A.I.M.E.

Seams increasing in production are the Pocahontas No. 4, Powellton, Fire Creek and Upper Freeport. Those decreasing are the Beckley, No. 2 Gas, Coalburg and Sewickley. Production from seams 5 ft. or more in thickness made up 45.9 per cent of the State total production in 1925 and 47.4 in 1939. Percentages of mines mechanized were 1.4 and 29.2, respectively. In 1925 1,210 mines were in operation and the daily tonnage per mine was 520. For 1939 the comparative figures were 1,290 and 515.

First prize in the A.I.M.E. contest was awarded to a paper, "Dampening Capacities of S.A.E. 1020 and 2320 Steels," prepared by Lester Tarnopol and James R. Morgan as a thesis for M.S. degrees in metallurgical engineering, University of Kentucky, June, 1941. In the absence of the authors, Mr. Smith briefed the paper.

The Good Earth

Illinois coal, in several veins, lies atop Illinois oil, in varied geological formations. At Centralia, small oil seepages reached the mine workings years ago—perhaps encouraged the deeper drilling that brought in heavy oil production. Farmers garner crops amid this feverish activity.

The latest development is at Benton, where more than 100 wells have pierced coal workings to extract triple pay from mother earth. Wells are at intervals of about 300 to 400 ft. Chicago, Wilmington & Franklin Coal Co. has an engineering crew assigned to well location. This enables it to protect its coal workings.

This field is but 7 months old as an oil producer. It is shipping 30,000 bbl. a day. Drilling goes on apace, tanks are erected, pumps churn away 24 hours a day, and waste gas flames wave in the wind. Benton, a town that once boomed because of coal, is putting on oil-boom airs.

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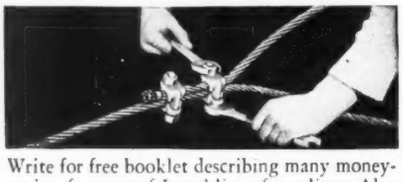

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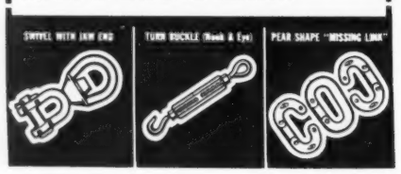

It indicates that shock-transmission characteristics can be controlled in the metallurgical furnace. An application example is the tooth of a strip-shovel bucket made of a material which will transmit the least shock from the hard-surfaced digging points to the lip.

Hydraulic Vs. Air Brakes

Hydraulic brakes for mine locomotives, according to a paper prepared by C. S. Allen, Jeffrey Mfg. Co., and read by G. R. Spindler, West Virginia University, have the advantages of requiring small space compared to air brakes, weighing only 295 lb., preventing brake-shoe drag and thus slowing tire wear, providing quick and almost effortless application for both speed limiting and total emergency stops, and removing the tendency for men to buck and plug motors. West Virginia has the largest number of applications. This type brake is especially suitable to tandem and heavy locomotives requiring power brakes.

Five old locomotives of the Clover Splint company in Kentucky have been equipped with the hydraulic brakes, remarked Mr. Matthews. Some are on tandem units and in those cases only one locomotive is equipped with pump. Parts are on order for equipping one gathering locomotive.

Recovery of coal on the outside, as a rule, is cheaper than cleaning in the mine, and refuse facilities of most cleaning plants must be increased, summarized V. D. Hanson, Pittsburgh Coal Co., after presenting by projection and discussion a number of tables incorporated in his paper, "Restriction Placed on Mechanized Mining by Existing Surface Coal Preparation." For the most part the data related to experience at the Pittsburgh Coal Co.'s mines and cleaning plants over the years including the shift from hand to mechanical mining. Plant losses have increased each year. High costs of hand picking were indicated by a table showing a range of $0.38 to $14.28 per ton of refuse picked.

Mr. Hanson stated, in effect, that the best indication of coal-cleaning success is customer reaction. Replying to questions, he agreed that, "when you can hold the slate up in the mine, it is the thing to do," but he qualified by adding, "if you can afford it." His company, however, has secured the lowest mine cost by shooting all of the slate down and cleaning on the outside.

At the mines under his management, said Mr. Pursglove, there has been no added preparation cost by using mechanical cleaning, and now a smaller percentage of coal goes to the dump than when all cleaning was by hand. Of customer complaints, 95 per cent are on that 5 per cent of the output which is hand picked.

Education is almost useless in promoting smoke abatement among domestic users, according to William G. Christy, smoke abatement engineer, Hudson County, New Jersey. More stokers and the use of smokeless coal or processed fuels, such as Carbonite and Solarite, are remedies for domestic smoke. Successful abatement among commercial plants, including large heating plants, requires regulation of design of new installations and cooperation among fuel dealers, architects, contractors and fuel users. Policing is most successful where it is done by the users themselves by reason of an association of the offenders and rivalry between plants.

That all fuels can be burned smokelessly and the blame for smoke rests on the way they are burned is a doctrine of the Hudson County abatement. Other fuels besides coal—oil, for instance—are among the smoke offenders. To be successful, smoke-abatement campaigns must be long-range affairs with never ending pressure and should be crystallized to a permanent basis comparable to that used in assuring purity of water supply. Years are required to effect the replacement of old plants with new smokeless plants.

Too many places, according to Mr. Christy, still have only half-hearted cooperation from the coal industry. Producers should help their customers abate smoke. Dealers have the bad habit of substituting without warning to a customer a coal which will make smoke unless firing methods are changed. There is need for continued research on fuels. Dealers in Hudson County are "called" for using the term "smokeless coal" and are told to use the term "low volatile" instead. Only anthracite and coke are smokeless, according to Mr. Christy.

Carl Scholz, who in 1916 was a member of the smoke abatement commission in Chicago, which city has continued the work to date, said that education was almost useless and that strict ordinances are required. He pointed out that in St. Louis the fuel found next best to coke is the low-temperature product made in southern Illinois.

That the St. Louis example will accomp-

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Nation-wide attention is being called to the advantages of buying Defense Savings Bonds. The cash received for bonds, it is pointed out, is put to work in the defense program, and at the time the bonds are an insurance against financial consequences of a post-war readjustment.

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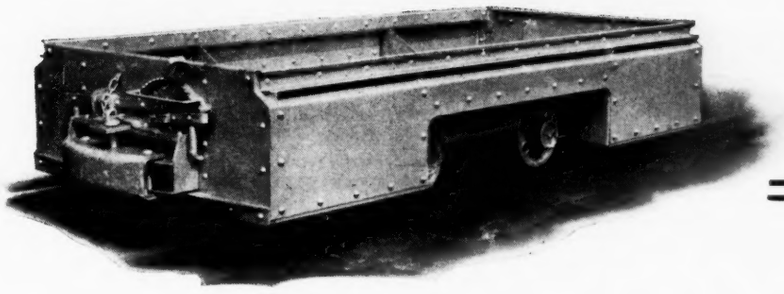
Plenty of weight was saved—strength and corrosion resistance added—by building 800 of these mine cars with Mayari R.



Why design your movable mine equipment with regular carbon steel when deadweight can be cut up to 40 per cent by building with lighter sections of Mayari R? Nor are deadweight savings the only advantage of this low-alloy high-strength steel.

Mine equipment built with Mayari R will last longer. That's because Mayari R has five to six times more resistance to corrosion than mild carbon steel, two to four times that of copper-bearing steel, plus high endurance limit and excellent resistance to impact.

Mayari R is highly ductile and is easily fabricated with regular shop practices and on standard shop equipment. Mayari R is also easily welded and does not need costly heat treatment.

Make a profitable experiment. Design your next mine car, skip, cage or loader to include Mayari R. Considering deadweight and operating expense saved, longer life, and low cost of fabrication, see if the use of Mayari R is not more than justified, despite its slightly higher cost over mild carbon steel. Send today for new booklet, on Mayari R.

Look at these typical properties of Mayari R sheets and plates:

Size	Yield Point p. s. i.	Tensile Strength p. s. i.	Elongation % in 8 in.	Brinell Number	Bend Test
14 ga.	52,600	70,400	23.3	145	flat
3/16 in.	57,600	71,900	28.0	137	flat
3/8 in.	58,200	78,400	28.0	156	flat
1/2 in.	54,900	78,400	25.5	152	flat

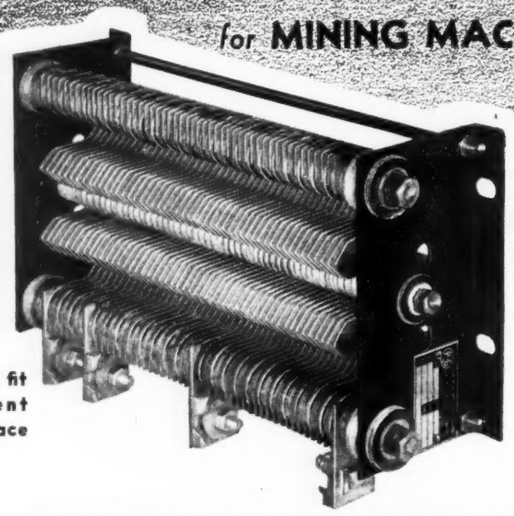
BETHLEHEM STEEL

BETHLEHEM STEEL COMPANY

P-G Steel Grid Resistors

By years of effective, trouble-free service, definitely prove their value . . .

for MINING MACHINES



Designed to fit your present resistor space

Built entirely of steel and high-grade mica—Nothing to crack, chip or break—Not affected by moisture, vibration or corrosive fumes—Adequate in-built capacity to handle an occasional overload—Try them on your Mining Machines——NOW.

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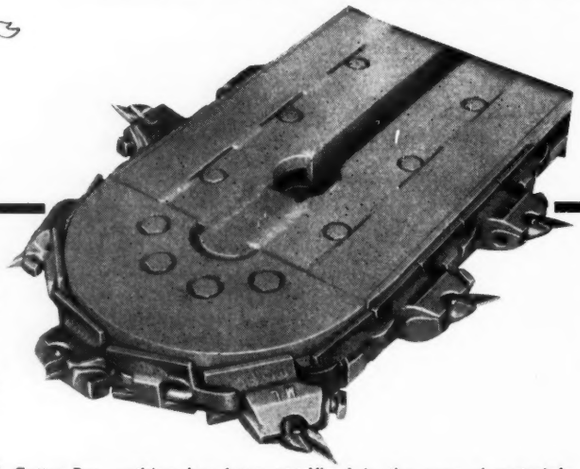
JIM SLIM says:

"I'LL TAKE MY HAT OFF TO THE NEW BOWDIL CUTTER BAR"



Here's first-rate efficiency, in a *new, compact* bundle . . . the redesigned BOWDIL Cutter Bar. It incorporates all the better features of the former bar, plus many new characteristics. Try it on your cutting machines, and let it speak for itself . . . then you, too, will *take your hat off* to its superior efficiency.

In the new BOWDIL Cutter Bar, nothing has been sacrificed in the way of materials. New steel alloys . . . new long-lived metals for the spots that wear . . . new, specialized designs, make this bar better than anything before available. The unique Z-Bar construction gives it more rigidity than previously obtained. Let us tell you more about it!! Call in one of our representatives, or drop us a line . . . we'll forward complete details immediately.

The BOWDIL Company

COAL CUTTING EQUIPMENT

Canton Ohio

lish more for the coal industry than is now realized was the view of Mr. Koepler. A consciousness of the problem is more important than the type of coal. As an example, he cited the success of Cincinnati in burning river-transported coal, most of which is high-volatile.

Theoretical proposals for recovery of the 20 per cent residual oil in the sands of depleted oil fields were outlined in a paper termed "Tertiary Recovery of Oil," written by Sylvain Pirson, Pennsylvania State College, and briefed by H. J. Wasson, petroleum consultant, New York. About 25 small strip operations are intermittently mining manganese ore in Virginia, mostly west of the Blue Ridge, according to a paper prepared and read by R. J. Holden, head of the department of geology, Virginia Polytechnic Institute. The ore occurs in relatively small pockets in folded measures below limonite.

Chairmen and vice chairmen of the three sessions were: first, Veleair C. Smith and Lee M. Morris; second, J. E. Tobey and L. I. Cothern; third, R. H. Morris and A. R. Matthews. The meeting was concluded with a banquet at which Dr Charles E. Lawall, president, West Virginia University, spoke briefly.

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T.C.I. Employees Get Medals For Long Service

Sixty-nine employees of the Tennessee Coal, Iron & Railroad Co., Birmingham, Ala., of whom eight were coal-mine workers, have been awarded medals in recognition of long service records with the company, according to Robert Gregg, president. Two miners have seen 35 years' service: two have been with the company 30 years, and four for 25 years.

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Personal Notes

ERNEST B. AGEE, lately superintendent of the Youngstown Mines Corporation at Dehue, W. Va., has been promoted to operating head of the coal mines of the Youngstown Sheet & Tube Co. Besides the Dehue property these include the mines of the Buckeye Coal Co., Nemacolin, Pa. Mr. Agee will have headquarters at Nemacolin.

MARTIN F. BRENNAN, president, District 9, United Mine Workers, with headquarters at Shamokin, Pa., has resigned that position to take over new duties as regional representative for the international union. This is a new post created to relieve pressure on Thomas Kennedy, international secretary-treasurer. In his new capacity Mr. Brennan will be contact man or tri-district trouble shooter. His place as district president will be filled by the promotion of JOSEPH KREHINSKI, vice president.

JAMES E. CAMPBELL, a 1940 fuel technology graduate of Pennsylvania State College, who has been employed as assistant chief inspector of preparation by the Stonega Coke & Coal Co., Big Stone Gap, Va., has been promoted to chief inspector of preparation.

R. T. DANIEL has resigned as president

of the National Coal & Coke Co., coal and coke sales agency, Birmingham, Ala., and established the R. T. Daniel Coal Co., with Earle M. Evans. Mr. Daniel also has resigned official connections with the Cane Creek Mining Co. and the Alta Coal Co., Inc., operating companies, but retains his interest in the Franklin Coal Mining Co., with mines at Powhatan, Ala., and will continue as its president.

THOMAS GETTINGS, well known as district representative of the Mine Safety Appliances Co., became full-time safety director for the Hanna Coal Co., St. Clairsville, Ohio, as of July 1. Though he will maintain headquarters at St. Clairsville he will conduct a safety program and assist in furthering such work at each of the company's mines.

RANDOLPH H. HARRIS, a recent graduate of Lafayette College, has joined the Pittsburgh Coal Co. as mining engineer.

O. B. HEWITT, formerly treasurer of the Gauley Mountain Coal Co., has been made president of the company, vice George B. Agnew, deceased.

DR. ERNEST M. HOPKINS, chairman of the Minerals and Metals Group, Priorities Division, Office of Production Management, has resigned that post in order to return to his duties at Dartmouth College, where he has just celebrated his 25th anniversary as president. Dr. Hopkins, who served during the World War as assistant to the Secretary of War, in charge of industrial relations, joined the Priorities Division in January. He was the guest at a testimonial luncheon given June 26 by E. R. Stettinius Jr., Director of Priorities, and members of his executive staff.

R. L. IRELAND JR., president, Hanna Coal Co., was reelected president-chairman of the board of the Ohio Coal Association at its annual meeting. Other officers renamed are: vice president, E. H. DAVIS, chairman of the board, New York Coal Co.; executive vice president, EZRA VAN HORN; secretary-treasurer, E. H. MILLER; assistant secretary-treasurer, F. H. BOHECKER; directors—S. A. COTTINGHAM, president, Hocking Valley Mining Co.; A. F. DEIBEL, president, A. F. Deibel Coal Co.; J. F. HILLMAN, president, Industrial Coal & Iron Co.; S. B. JOHNSON, president, Lorain Coal & Dock Co.; E. S. WILLARD, general manager, United States Coal Co.; GEORGE M. JONES JR., vice president, Cambria Collieries Co.; J. H. MILES, president, Akron Coal Co.; J. C. NELMS, vice president, Ohio & Pennsylvania Coal Co.; W. L. ROBISON, president, Youghiogheny & Ohio Coal Co.; R. W. RUTLEDGE, president, Midvale Coal Co.; H. G. SCHMIDT, general manager, Wheeling Township Coal Mining Co., and Messrs. Davis and Ireland. WHITNEY WARNER JR., president, Warner Collieries Co., and O. C. LARSEN, vice president, Powhatan Mining Co., were elected to fill the vacancies caused by the deaths of the Warner brothers, Whitney and Hoyt.

W. M. LACEY has been named superintendent of the Sayreton mines of the Republic Steel Corporation, Sayreton, Ala., vice H. M. JOHNSTONE, resigned. Mr. Lacey has lately been superintendent of the Docena mine of the Tennessee Coal, Iron & Railroad Co., and was connected with the mining operations of the Alabama By-Products Corporation at one time.

Bertrand A. Landry

BERTRAND A. LANDRY has joined the staff of Battelle Memorial Institute, Columbus, Ohio, where he is engaged in research and developmental work in the division of fuels research. He is well known for his investigations and publications on the principles of combustion, the distillation of oil shales, the theory of sampling, and the chemical treatment of fuels. A graduate of Massachusetts Institute of Technology and Carnegie Institute of Technology, Mr. Landry was for 18 years associated with the U. S. Bureau of Mines prior to joining the Battelle staff.

JOSEPH MARCHESI, member of the executive board, Illinois United Mine Workers, has been named as Assistant Director of Mines and Minerals of Illinois.

D. F. MCELHATTAN, formerly safety engineer for the southern Illinois district, Peabody Coal Co., has been placed in charge of the company's safety activities covering 18 mines. The company has transferred its safety headquarters from its Chicago office to the district office at Marion, Ill.

ROBERT M. REID has been appointed assistant manager of the traffic department of the Tennessee Coal, Iron & Railroad Co., having been promoted from the post of chief of the rate bureau in the traffic department. He has been with the company since 1917.

J. W. STARKS, formerly district superintendent for the Peabody Coal Co. at Marion, Ill, has been appointed district superintendent for central Illinois with headquarters at Taylorville. This includes the mines at Springfield.

WILFRED SYKES has been elected president of the Inland Steel Co., which has coal mines at Wheelwright, Ky. He succeeds PHILIP D. BLOCK, who was made chairman of the executive committee.

COALMASTER

STAGGERED TOOTH DRILLS

FOR POST and MACHINE MOUNTED DRILLS

•

QUICKER AND LESS TIRESOME TO HANDLE

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Breaking action works faster . . . takes less power . . . eliminates coring

•

KOLES ARE STARTED AND DRILLED QUICKLY AND EASILY

Less vibration — freedom from bit breakage — you save on power — auger wear minimized—lower costs from start to finish.

Let a COALMASTER specialist show you why these tools are quicker to handle and cut your costs.

Use the coupon now—get all of the facts — avail yourself of the service of specialists in drilling—our job is to solve all kinds of drilling problems under varying conditions.

The COALMASTER is made in sizes to drill correct holes for all powder, CARDOX, AIRDOX, Hydraulic, and special requirements.

CENTRAL MINE EQUIPMENT CO.,
4520 Enright Ave., 841
St. Louis, Mo.

Send us your folder on COALMASTER Tools for Blast Hole Drilling.

Name..... Title.....

Company.....

Location.....

HENRY S. WALLACE, Shelburn, has been named chief State mine inspector of Indiana, vice FRED FERGUSON, resigned. Mr. Wallace has been chief deputy in the Mines and Mining Bureau since 1937.

A. A. WILSON, of New Orleans, has been elected president of the National Coal & Coke Co., in addition to other changes following the resignation of R. T. Daniel to enter private business. Other officers are: C. C. WILLIAMS, vice president and comptroller; E. A. GEOHEGAN, secretary-treasurer; JAMES C. STEPHENSON, assistant secretary and assistant treasurer. The company controls the operations and distribution of production from the Cane Creek Mining Co. and the Alta Coal Co., Inc.

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Mining Repair and Maintenance Materials Given Priority Status

MINING was one of a group of 26 "essential" industries given priority status on repair and maintenance materials and equipment necessary for uninterrupted operation in an order dated June 30 and released the following day by the Office of Price Administration and Civilian Supply (OPACS). Action was taken, it was announced, because the growing demands for raw materials for the defense program have made it difficult for manufacturers of repair and maintenance equipment and supplies to fill their orders.

The OPACS priority order, which will be administered and enforced by the Office of Production Management (OPM), places requirements of the 26 industries ahead of all other civilian demands and also ahead of defense requirements "to the extent consistent with the defense program as determined by OPM." Earlier OPACS orders covering priorities on locomotives and freight cars subordinated allocations to all defense orders. Subsequent limited blanket orders issued by OPM gave an A-3 rating on scarce materials to a number of locomotive and car builders and repair shops. Limited blanket A-3 priority rating—but apparently not restricted to repair and maintenance requirements—was granted by OPM to about 40 manufacturers of mining machinery and equipment in an order dated July 29.

What Is a "Defense" Order?

As defined by the Priorities Division of OPM, a defense order means any contract or order for products to be delivered to or for the account of: (1) the army, navy, U. S. Maritime Commission, Panama Canal, Coast and Geodetic Survey, Coast Guard, Civil Aeronautics Authority, National Advisory Commission for Aeronautics or the National Defense Research Council; (2) Government of Great Britain and the government of any other country whose defense the President deems vital to the defense of the United States; (3) any other order for products which the Director of Priorities determines is to cover direct or indirect defense requirements by assigning a preference rating of A-10 or higher, and (4) any contract or order placed by any person for the delivery of equipment required by him to fulfill orders on hand where such material or equipment is to enter directly or indirectly into the manufacture of products specified in (1), (2) and (3).

Only replacements in kind, however, were provided for under the OPACS order. Replacement with more efficient equipment or enlarged facilities are taboo. These limitations are embodied in the section of the order entitled "Definitions" which reads as follows:

"As used herein, the term 'maintenance' means the upkeep of property and equipment, and the term 'repair' means the restoration of property and equipment to a sound state after wear and tear, damage, destruction of parts, or the like. These terms include replacement of parts which have been worn out, damaged or destroyed, but do not include replacement when the new part or parts represent a change-over in model, the introduction of a superior type equipment to replace usable equipment of an older or inferior type or design, or a substitution more extensive than that which is necessary to replace the part or parts that are worn out, damaged or destroyed."

Excessive Inventories Barred

Neither can this priority status be used to build up excessive inventories of parts or equipment. "Allocations made under this program," states the order, "shall not be used to accumulate excessive inventories, or to divert parts still serviceable.

Meantime the general problem of delivery of raw materials grows increasingly difficult. Postponement of delivery dates on many items of mining equipment and supplies has become commonplace. The latest revised Priorities Critical List (July 7) issued by the Priorities Division of OPM contains over 300 items and classes of items on deliveries of which army and navy contracting officers may assign preference ratings. Seventeen items on the list are now subject to industry-wide control and allocation by OPM.

These items are: aluminum and aluminum alloys; borax, boric acid, chromium, copper, cork, fire prevention and fighting equipment, machine and metal working tools, magnesium and alloys, neoprene, nickel, nickel-alloy steel, polyvinyl chloride, rubber (raw, processed and fabricated), steel (semi-finished, finished and fabricated, including alloys), tungsten, ferro-tungsten and tungsten ore, zinc.

Among the major items used in coal-mining operations now included in the Priorities Critical List are: Angledozers, augers, portable battery chargers, roller and ball bearings, booms, fabricated brass, fabricated bronze, bulldozers, electric and telephone cables of all kinds, air compressors, automatic control equipment for electric motors, cordage and twine, cranes, diamond-point tools, diesel engines, floodlighting equipment, brass and aluminum forgings, diesel fuel, gas masks, power hoists, drafting instruments, first-aid kits, laboratory equipment, steel lockers, locomotives (diesel, gasoline and electric), monel metal, electric motors other than fractional horsepower, all types of pumping sets, all types of sending and receiving radio apparatus, synthetic rubber, tractor-drawn scrapers, trailers (2-, 4- and 6-wheel, welding rod.

New Bureau of Mines Approvals

Two approvals of permissible equipment were issued by the U. S. Bureau of Mines in June, as follows:

Goodman Manufacturing Co.—Type 1124-RJ slabbing machine; 50- and 15-hp. motors, 250 volts, d.c.; Approval 431; June 27.

Jeffrey Manufacturing Co. — Type 24-L longwall mining machine; 50-hp. motor, 250 and 500 volts, d.c.; Approvals 432 and 432A; June 30.

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Harr Asks Maximum Coal Prices Be Set by Director Gray

Luther Harr, Bituminous Coal Consumers' Counsel, took official action on July 23 to prevent profiteering in bituminous coal. Declaring a sharp upward price movement would impede the nation's defense effort, Dr. Harr petitioned Director Howard A. Gray, of the Bituminous Coal Division, to establish maximum prices at approximately 10 per cent above existing minimum prices.

"We are acting," said Dr. Harr, in explaining his move, "to see that prices are kept within reason. When we are urging people to buy coal now, and patriotism responds, we are not going to see them exploited."

In his petition, Dr. Harr made these assertions:

Consumers report excessive prices in widespread markets.

Increases of 50 to 75c. per ton over minimum prices are reported at some mines, with future deliveries quoted even higher.

Some coal producers have taken advantage of the demand for fuel stimulated by the Consumers' Counsel campaign for summer buying of coal as a defense measure. Dr. Harr said he was happy to learn that all producers had not done this.

Producers and district boards given opportunity to justify increases, if they exist as a result of higher mine wages or other causes, have sought repeated delays in proceedings, despite objections of the Consumers' Counsel.

Abuses, existing and threatening, can be rectified and prevented only by immediate imposition of maximum prices in all the country's 22 producing districts.

Maximum prices as suggested would yield a reasonable return above the weighted average total cost for each district.

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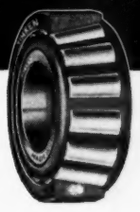
Miners Idle During Suspension Denied Jobless Benefits

Coal miners thrown out of work in April while the United Mine Workers was negotiating a new wage agreement with the operators were denied unemployment benefits by the State Industrial Commission of Colorado late in June. Employees of seven companies were affected by the decision. An eighth mine, the Haybro, operated by the Hayden Coal Co., closed two days be-

THIS FLIGHT CONVEYOR DELIVERS THE COAL

on

DODGE-TIMKEN Bearings



The flight conveyor pictured above is part of a 20-ton per hour coal handling system installed by Dodge Manufacturing Corporation at the Peru, Illinois, Municipal Light and Power Plant. It transports the coal from dead storage to live storage elevator.

Operating on Dodge-Timken Type "C" Pillow Blocks—sealed against the entrance of even the finest dust—the conveyor keeps the coal moving constantly with minimum power consumption, lubrication and maintenance.

Due to the requirements of the National Defense Program industry needs more power than ever before and power generating equipment of all kinds is being pushed to the limit to supply it. Many manufacturers who produce their own steam for power or processing, have proved it pays to have Timken Bearings in coal conveyors, pulverizers, stokers, pumps and other power plant equipment.

THE TIMKEN ROLLER BEARING CO., CANTON, OHIO

Tapered Roller TIMKEN BEARING EQUIPPED

TIMKEN

TRADE-MARK REG. U. S. PAT. OFF.

TAPERED ROLLER BEARINGS

Manufacturers of Timken Tapered Roller Bearings for automobiles, motor trucks, railroad cars and locomotives and all kinds of industrial machinery; Timken Alloy Steels and Carbon and Alloy Seamless Tubing; and Timken Rock Bits.

fore the suspension, and its miners are entitled to benefits, the Commission held.

Employees of six of the companies filed separate suits in the District Court at Denver on July 3 seeking to have set aside the Commission decision denying them benefits. The complaints alleged the cessation of work was due to a mutual understanding between the operators and employees pending the putting into effect of a new wage agreement and not to a strike.

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Pittsburgh Co. Picks Coal Queen And Champion Miner

A "Queen of Coal" and a "Champion Miner" were picked in contests featuring the fifth annual picnic of Pittsburgh Coal Co. employees on June 21. About 25,000 were in Kennywood Park, outside Pittsburgh, Pa., for the day's events.

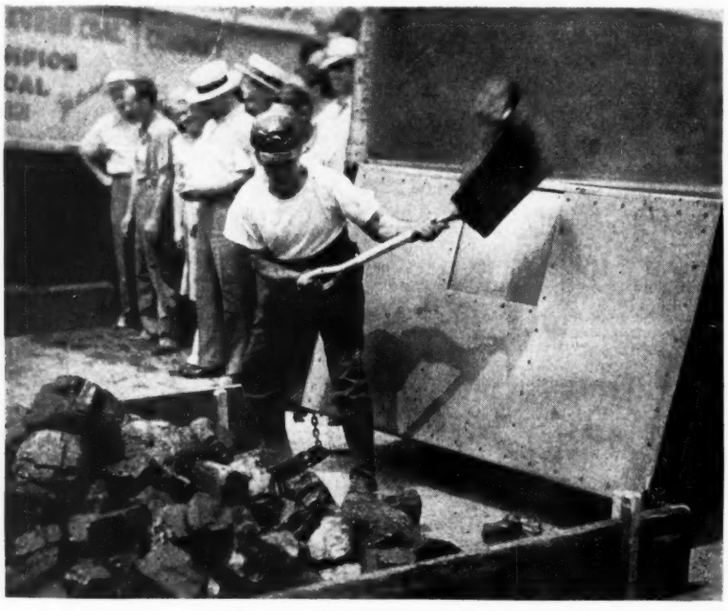
In selecting the champion miner, four factors were considered: safety record; appearance in working clothes, particularly from the safety standpoint; personality, and speed in loading a ton of lump coal from the ground into a truck. John Kulek Jr., of the company's Crescent mine, was the fastest loader, shoveling his ton of coal in 3 minutes and 40 seconds; but when all factors were considered, Patsy Siciliano, of Montour No. 10 mine, was voted champion miner. Peter Sherman, of Banning No. 1 mine, was second, and John Kashura, of Euclid mine, was third.

"Queen of Coal," selected in competition with 14 other girls representing the various mines, plants and divisions of the company, was Miss Gail Frye, 19, of California, Pa., representing the river transportation division. Second and third place winners, respectively, were Miss Bertha Ocepek, 19, representing Montour No. 10 mine, and Miss Ruth Munson, 21, representative of the Library shops.

All contestants were employees or relatives of employees of the company. The Queen of Coal's mother is a cook on the Str. "Champion Coal," which operates between Brownsville and Weirton, on the Monongahela River. The Champion Miner and Queen of Coal each received an inscribed gold watch as a prize. Second and third place winners got cash awards.

"Queen of Coal"

Miss Gail Frye, 19, of California, Pa., was picked from 15 contestants representing the mines, plants and divisions of the company at the fifth annual employees' picnic.



"Champion Miner"

Patsy Sicilliano, shown in action, represented the Montour No. 10 mine of the company in competition with representatives of eleven other mines, and was judged best all-around miner.

Relaxing of Agency Regulations Refused by Coal Division

An order refusing broad relaxations in regulations governing Indiana Coals Corporation, Terre Haute, Ind., a regional marketing agency, but modifying certain restrictions so as to allow the agency to operate with more flexibility was issued by the Bituminous Coal Division late in July. The Division recently granted provisional approval of the agency, which, under the Coal Act, may fix market prices above effective minimum prices and serve as a central marketing agency for competing coals mined by member producers, subject to regulation by the Division.

In its order, the Division rejected the agency's contention that no more authority should be exercised over its activities than is exercised over the activities of individual producers or their sales agents. The order states that if this contention were accepted with respect to price-fixing activities, it would be tantamount to conferring on the agency unlimited price-fixing powers until such time as the Division should establish maximum prices for all bituminous coal mined in the country.

The Division stated that the Coal Act confers a distinct privilege upon producers in providing them immunity from the anti-trust laws for price-fixing and cooperative marketing arrangements approved by the Division, but held that it is clear that Congress intended this privilege was to be granted only if accompanied by governmental supervision designed to protect the public interest. The Coal Act places upon the Division the duty of providing this protection.

While denying broader relaxations in the regulations, the Division's order modifies the earlier order by authorizing the marketing agency to reduce market prices it has made effective for its members' coals whenever it chooses to do so, without having to obtain prior Division approval for such reductions. The agency cannot charge market prices less than the effective minimum prices established by the Division.

Division Must Approve Rises

However, the agency still must obtain prior Division approval before it may raise the market prices it has established for members' coals. Also, the order provides that the Division may suspend classifications and prices already made effective by the agency only after a public hearing, and that any suspension in effective market prices will not affect transactions already consummated.

The Bituminous Coal Division on July 22 had embarked on a program looking toward the tightening of regulations governing marketing agencies and setting up machinery for establishing maximum prices for coals sold by such agencies whenever found necessary for protection of the coal-consuming public.

Machinery for establishing maximum prices and marketing regulations when necessary was made a part of the regulations contained in orders granting provisional approval to Indiana Coal Corporation, Brazil Block Fuels, Inc., and Belleville Fuels, Inc., most recently authorized marketing agencies. Now the Division is studying regulations governing other marketing agencies for the purpose of taking

such action as it finds appropriate for more effective administration of provisions of the Coal Act.

An order signed by Acting Division Director Dan H. Wheeler has been issued directing Appalachian Coals, Inc., Cincinnati, Ohio, to show cause in a hearing on Aug. 7 why machinery shall not be set up for establishing maximum prices and marketing regulations for its coals when found necessary. In addition, this order and also one applying to Belleville Fuels, Inc., require cause to be shown why certain other regulations should not be tightened. The latter hearing will open on Aug. 4. Both hearings are to be held in Washington, D. C., before Trial Examiner Charles S. Mitchell.

Under the regulations set up for the three newest agencies, those proposed for Appalachian Coals, Inc., and under study in connection with other agencies, maximum prices and marketing regulations would be established for an agency's coals whenever the Division Director has reason to believe that its activities or those of its producer members or sub-agents are tending to restrict unreasonably the supply of coal in interstate commerce, to prevent the public from receiving coal at fair and reasonable prices, or are operating against the public interest in any market area.

Regulations proposed by the Division would limit the membership of Appalachian Coals, Inc., to code members whose mines are located in District 8 (southern West Virginia, western Virginia, eastern Kentucky and northeastern Tennessee). It is proposed to restrict Belleville Fuels, Inc., to the sale of not more than 80 per cent of the bituminous coal produced in the No. 5 and No. 6 geological seams in the Belleville and DuQuoin districts in Illinois. The proposed geographical limitations are in accord with the terms upon which the agencies sought provisional approval.

Among other proposed changes in regulations is one which would require the agencies to report to the Division and the Consumers' Counsel all classifications of coal and market prices presently established by them for members' coals, together with the reasons in support of them. This regulation would also require that all future increases in established market prices and classifications be so reported as soon as they are determined, and provide that such changes should not become effective until ten days after they are filed, unless the Division otherwise directs.

Under the proposals, if adopted, the Division would require the agencies to show cause at any time why any or all of their established market prices and classifications should not be modified, and issue orders suspending any or all of them. The proposals also would require the agencies to file with the Division and Consumers' Counsel copies of all monthly or weekly consolidated reports issued showing the distribution of the agencies' coals, the amounts of money realized from the sale of them, and other information.

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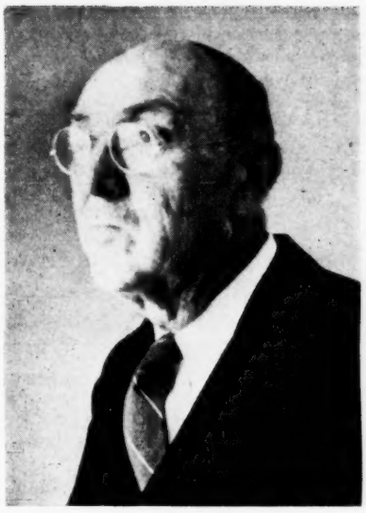
Banning No. 2 to Resume

Operations will be resumed about Aug. 1 at Banning No. 2 mine of the Pittsburgh Coal Co. with about 200 men employed. The mine, located at Whitsett, Pa., has been closed for 2½ years.



Fred Richart

Richart to Sub for Lambur

F. W. Richart, since 1939 special contributor to *Coal Age*, has been made interim assistant editor in place of Charles M. Lambur, Jr., now on leave. Mr. Richart was for many years a representative of the General Electric Co. in the coal-mining field, spending the greater part of that time in the Illinois section until his retirement from the G. E. organization in 1939.

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Gould to Advise on Coal Prices

Appointment of Gerald B. Gould, president, Fuel Engineering Co., New York, as advisory consultant on coal prices in the Fuel Section, Office of Price Administration and Civilian Supply, was announced July 28 by Dr. J. K. Galbraith, Assistant Administrator in charge of the Price Division.

Mr. Gould has served as a consultant to industrial and commercial consumers of fuel for the last 30 years and has had broad experience in the economics of the coal industry, especially in regard to traffic movement. At OPACS he will work on solutions of the difficulties that may confront coal suppliers and users in the Northeastern States during the coming fall and winter. Mr. Gould is a graduate of Yale University and the University of Pennsylvania.

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Clover Darby to Produce Soon

The plant of the Clover Darby Coal Co., Inc., Closplint, Ky., is nearing completion and probably will go into operation soon. The company was incorporated in December last, and construction of the new plant began the following month. It is planned to use conveyors on all underground work with 440-volt a.c. power supply, except for haulage purposes, where d.c. will be used. The conveyors are to be used only in the working places and mine cars from the butt entries to the tipple. A. R. Matthews is president and general manager, and the Southern Coal Co. will be exclusive distributor of the output.

Harr Warns Coal Consumers Against Runaway Prices

Luther Harr, newly appointed Bituminous Coal Consumers' Counsel, warned consumers on July 3 to avoid panicky buying at runaway prices. He stated that while the office of the Bituminous Coal Consumers' Counsel is actively engaging in a campaign to promote the summer sale and storage of bituminous coal, it does not advise consumers to buy at prices substantially above those they were asked to pay last winter.

Dr. Harr said: "I wish to emphasize that on the basis of present estimates, there is no reason to suppose that there will be any shortage of coal at the mines. Such local shortages as may occur would result from the increased burden on the transportation system of the nation in the fall. It is for this reason that we are urging consumers to buy and store their winter coal now. If consumers and retailers will cooperate in this effort, the danger of temporary local shortages will be greatly lessened. While it is true that wages have been increased, other cost factors have been reduced. Balancing wage increases against other cost reductions, it does not appear that minimum prices will be increased on the average more than 10c. per ton."

•

Uptrend in Anthracite Prices Studied by OPACS

Upward trend of anthracite prices was discussed at an exploratory meeting on July 18 between the Office of Price Administration and Civilian Supply and representatives of principal Pennsylvania hard-coal producers. Extensive data were submitted by industry representatives for study and analysis by OPACS' staff in the light of that agency's specific interest in preventing unreasonable price increases during the present emergency.

The meeting was attended by representatives of the Glen Alden, Hudson, Jeddo-Highland, Lehigh Navigation, Pennsylvania and Lehigh Valley coal companies; Philadelphia & Reading Coal & Iron Co., Susquehanna Collieries Co. and also by S. D. Ringsdorf, president, Anthracite Operators' Association.

•

600 Quit in Support of Foremen

A "sympathy" strike in behalf of foremen, assistant foremen and firebosses was staged on July 28 by 600 miners in two Ehrenfeld (Pa.) district mines of the Pennsylvania Coal & Coke Corporation. Foremen, assistant foremen and firebosses, who do not come under the jurisdiction of the United Mine Workers, formed a new union and are seeking a wage rate on a level with other workers in this class in Cambria County.

•

Battelle Again Expands

A fourth major building expansion program in recent years is under way at Battelle Memorial Institute, Columbus, Ohio, where a $160,000 addition to the process metallurgy laboratory building is under construction,

according to Clyde E. Williams, director. Additional space demands of enlarged research programs concerned with the study of chemical and metallurgical processes on a pilot-plant scale will be provided for when the new structure is completed.

The new structure will be 70×105 ft. with five full stories, providing 35,000 sq.ft. of additional space. Its steel, brick and concrete construction will conform with that of the other institute buildings. Office-laboratory facilities are planned for 50 additional research engineers and technicians. The new laboratories will be equipped with the most modern facilities. To handle the equipment necessary for pilot-plant operations, provision has been made for high floor loads and the necessary crane service.

•

New Operation to Start On Vancouver Island

Canadian Collieries (Dunsmuir), Ltd., is opening the Timberland Basin coal field on Vancouver Island, B. C. Recently dewatered after preliminary work done ten years ago, the workings were found to be in good condition. Although limited in extent, the coal is said to be of exceptionally high grade, underlying a strong conglomerate roof.

About 125 men will be employed in the new operation, and surface equipment will be taken from the Northfield mine, which is to be closed soon. The provincial government is regrading the western end of the road to accommodate heavy hauling and the transportation of miners. A branch power line is being constructed from the main line on the highway.

•

Pennsylvania Mine Explosion Kills 7, Injures 20

An explosion in Kent No. 2 mine of the Rochester & Pittsburgh Coal Co., near Indiana, Pa., on June 30 killed seven miners and injured 20. There were 265 miners in the workings when the blast occurred—at 9.15 a.m.—41 of whom were in the explosion area. Heath Clark, president of the company, said that reports indicated that coal dust rather than gas caused the disaster.

A coroner's jury inquiring into the disaster found that a foreman had been "negligent of his duty" and recommended that he be held "for further investigation." The verdict, returned July 24, stated that the blast was caused by an accumulation of gas and named Charles Ramsell as having been negligent.

George Steinhauser, chairman of an inspection commission of the State Bureau of Mines, said the commission found that Ramsell and an assistant, Elmer McGee, removed danger signs that had been set up in the explosion area by Fireboss Wilber Kinter. McGee died in the explosion. Kinter, Steinhauser testified, detected gas and posted the signs closing off an entire heading of five rooms where a crew of 41 men was to work that day.

The mine inspector said Ramsell inspected three of the rooms and took McGee's word the other two were free of gas, an assumption he declared that the foreman should not have made without personal knowledge. The explosion occurred in one of the two rooms approved by McGee. Steinhauser also criticized Lawrence J. Redding for having "failed to direct, provide the means and see to it that the mine foreman and all other employees under him complied with the law and all of its provisions."

•

Anthracite Output Control Bill Signed by Governor James

The voluntary production control plan of the Pennsylvania anthracite industry was legalized on July 7 with the signing by Governor Arthur James of a bill passed by the Legislature without debate requiring the Department of Commerce to promulgate such voluntary plans in the interest of business promotion. Under the plan a committee of operators meet each Monday in New York to estimate the market, which estimate is forwarded to the emergency committee in Harrisburg. The latter assigns production quotas to each cooperating producer for the week.

The measure excludes any operator who has not joined in the plan, as the result of an amendment made in the House to meet objection of some independent miners and operators. Those cooperating in the production control system claim to represent more than 95 per cent of the anthracite output. The new law would require the promulgation of such voluntary plans in any industry which has preponderant mineral resources in Pennsylvania.

•

Sentry Sets Up Larger Shovel

Sentry Coal Mining Co., Madisonville, Ky., on July 9 added an 85-B Bucyrus-Erie loading shovel to its roster of equipment. One of the improvements on this machine is the total inclosing of all gears, adding to its safety, quietness and life. This unit takes the place of a Bucyrus-Erie 50-B, increasing the capacity of the operation.

•

North Carolina Mine to Resume

Plans are under way for resumption of mining at the mouth of the mine of the former Carolina Coal Co., about 8 miles north of Sanford, N. C. Coal Products, Inc., composed of Southern Pines interests, including H. B. Chatfield and H. N. Butler, and recently chartered, has acquired property in the Deep River coal fields and is to begin work in the near future. Robinson & Robinson, mining engineers, Charleston, W. Va., are to be in charge of the enterprise, and modern machinery will be installed.

•

Maumee Opens New Operation

A new operation—Mine No. 26—4½ miles west of Linton, Ind., on the Bushrod branch of the Pennsylvania R. R., was opened by the Maumee Collieries Co. late in July. Coal is being removed by the stripping process, a 10-yd. Marion shovel being employed in uncovering the 6-ft. Indiana No. 6 seam.

Output is loaded into trucks which haul it to a central loading station, where it is transferred to railroad hoppers and shipped to Maumee Mine No. 23 for preparation. The operation is to have a capacity of 30,000 tons per month and standard Indiana sizes will be produced.

•

Closed Shop Contract Signed By Tri-County Operators

A closed-shop contract covering 1,800 miners in Hopkins, Webster, Union and Christian counties, Kentucky, was signed late in July by the Tri-County Coal Operators' Association and the United Mine Workers. The contract brings increases of $1.40 a day to mobile loaders and conveyormen, 12c. a ton on tonnage rates, 11c. to loaders, 1c. to machine workers and helpers, $1 a day to all other employees, and recognizes seniority right.

Ed. J. Morgan, president of District 23, U.M.W., said the agreement also carries a clause providing for a ten-day vacation with pay and prescribes time and a half for more than seven hours of daily work, or 35 hours a week.

•

Correale Reopens Colket Drift

Reopening of the Colket Water Level Tunnel by Frank Correale, Hazleton (Pa.) contractor, which began late in June at Donaldson, Schuylkill County, has progressed to the Primrose seam, where the workmen encountered a large fall of rock and earth which occurred after the drift was closed in 1928. When this has been cleaned up, rapid progress toward production of coal is expected.

Coal removed from this tunnel will be prepared at the modern new breaker erected by Mr. Correale at Donaldson.

•

Additions Built at Isabella

Improvements at the Weirton plant of the National Steel Co., Isabella, Pa., include a coke-loading bridge with a chute to load river barges, which was completed early in July. This addition was made in connection with the repair and rebuilding of 136 beehive ovens which had not been used since 1929. Other items on the program include the construction of a tunnel under a railroad line for the track that will take coke lorries from the ovens to the coke tipple and a 50-ton coke pusher and leveler. The last-named piece of equipment was built at the Weirton plant.

•

U.M.W. to Raise Defense Fund

With "defense the order of the day," the *United Mine Workers Journal* announces in its July 15 issue an assessment by the international union of 50c. per month for the months of July and August. The money will be deducted from the miners' pay in accordance "with provisions of the constitution and the various wage agreements."

The announcement stated, further: "your

organization must build up its financial resources and continue on this road so we may enter any crucial period which may lie ahead, secure in the knowledge that our organization is so strong numerically and financially that no enemy will dare attack us to take away the gains we have already achieved for our membership."

•

Mine Timber Studies Covered In Colorado Quarterly

"Mine Timber Studies" is the title of Vol. 36, No. 3 of the Colorado School of Mines Quarterly, which includes two papers: "Stresses in Mine-Drift and Timber Sets," by Raymond L. Grazier, and "Increasing the Endurance of Drift Sets," by Robert B. Gayer. Both are reports on research carried on under the direction of the department of mining of the Colorado School of Mines. The Quarterly, now ready for distribution, comprises 65 pages which include 26 halftone reproductions of photographs, 17 diagrams and charts, and 17 tables.

The first paper reports on laboratory tests on various phases of model timber sets, using direct loading, uniformly distributed loading, and uniformly distributed loading with a systematic interruption of the load. Tabulation of the data resulting from each test, together with sample calculations for each type of loading used, is presented.

In the second paper the results of loading on cap-and-post arrangements are recorded. The notes and data for 45 individual tests under various controlled loadings are given, together with diagrams. Photographic records were made of two representative tests at progressive stages of loading, and these records are reproduced.

The Quarterly may be obtained from the department of publications of the Colorado School of Mines, Golden City, Colo., at a cost of 50c.

•

Eleven Die in Alabama Blast

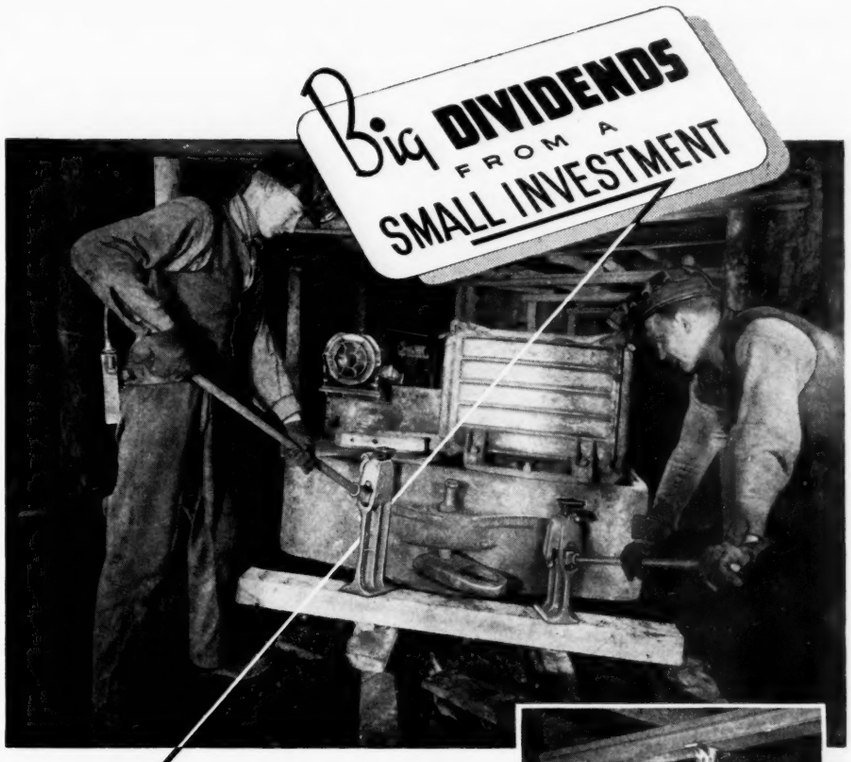
Eleven mine workers—two white and nine colored—were killed in an explosion which occurred July 10 in the Acmar mine of the Alabama Fuel & Iron Co., near Leeds, Ala. The blast occurred soon after the night crew had reported, and about 200 men were in the workings. The explosion took place about 2,400 ft. from the mine opening and its effects were confined to that immediate section. Unofficial report had it that a pocket of gas had been set off.

•

Acadia Co. Increases Wages

Acadia Coal Co., Stellarton, N. S., notified its employees late in June that they would receive a wage increase of 15c. a day over the basic rates set in a contract signed last February. The company employs about two thousand miners in the Pictou County area.

General Manager Michael Dwyer said in a statement that the increase, retroactive to June 1, had been made possible by an improvement in the company's financial position since the beginning of the year. He re-



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called that the company had promised two years ago to raise wages when funds became available. Daily paid men will receive a straight 15c. a day increase while men on contract work will be given an increased rate to bring their daily earnings up proportionately.

•

Ohio High Court Rules Against Operator Back Pay Appeal

An appeal by the Lorain Coal & Dock Co. and 22 other coal producers from a Franklin County (Ohio) decision refusing to restrain payment of $287,000 in unemployment compensation benefits to 6,500 miners for the 1939 suspension of work was dismissed by the Ohio Supreme Court at Columbus early in July. The high court held in a previous appeal that the miners were not on strike when they stopped work during negotiations for a new wage contract.

Twenty-three actions involving this question, however, still are pending in various common pleas courts. The miners have received their benefits, checks having been mailed out by the State Unemployment Compensation Bureau after the State Supreme Court refused to continue a restraining order that had held up the payments.

•

To Hold Civil Service Test For Federal Mine Inspectors

Since passage by Congress of the act authorizing the U. S. Bureau of Mines to make periodic inspections and investigations of coal mines the Bureau is charged with the responsibility for obtaining information on health and safety conditions, accidents causing serious injury or loss of life, and the occupational diseases of coal mining. A staff of inspectors is to be appointed from the employment lists set up as the result of an examination announced by the Civil Service Commission.

Coal-mine inspectors will be paid salaries ranging from $2,600 to $4,600 a year and will be assigned to work in the Bureau of Mines at various points throughout the country. No written test will be given but applicants will be rated on their training and experience. For the two higher grades ($3,800 and $4,600 a year), broad and progressive practical experience in connection with the safety-of-operation of coal mines is required, and some of this experience must have been in a supervisory capacity. For the assistant and associate grades ($2,600 and $3,200 a year respectively), experience in practical coal mining is required which included responsible experience in mine safety work.

For all these jobs, an applicant must show that his experience and training have included coal-mine operating or safety work, or technical work in practical mining engineering which gave him a thorough knowledge of the essentials of coal-mine inspection. For all but the assistant grade, provision is made for the substitution of college engineering courses for some of the prescribed experience.

The Commission urges qualified persons who have reached their 30th birthday, who have not passed their 55th birthday, who are not over 74 in. in height, and who can meet the high physical standards necessary for this work to file their applications. Applications will be accepted at its Washington office until Dec. 31, 1941. Further information and application forms may be obtained at any first- or second-class post office or from the Civil Service Commission.

Dr. R. R. Sayers, director of the Bureau of Mines, told a House appropriations subcommittee late in June: "We will have a different type of inspection from that which the State inspectors are doing. We will supplement their work rather than duplicate it." He said "about 30" inspectors of its staff of 107 would be assigned to Pennsylvania, where there are about 57 State inspectors.

•

Anthracite Engineers Consider Bootleg Situation

Discussion of the present status of the bootleg situation by R. Y. Williams, consulting engineer, Pottsville, featured the annual meeting of the Pennsylvania Anthracite Section, American Institute of Mining and Metallurgical Engineers, held July 12 at the Valley Country Club, Hazleton, Pa. There also were short talks by E. H. Robie and Chester Naramore, assistant secretaries, A.I.M.E., of New York. Sound pictures of the erection of the Golden Gate Bridge were shown and there were feats of magic by Raymond G. Bogardus.

Officers elected for the coming year are: chairman, Wilmot C. Jones, mining engineer, Jeddo-Highland Coal Co.; vice chairman, S. H. Ash, district engineer, safety division, U. S. Bureau of Mines; secretary-treasurer, Floyd S. Sanders, assistant district manager, Goodman Mfg. Co.; executive committee, for one year, W. H. Lesser, mechanical and electrical engineer, Pierce Management; C. A. Garner, vice president in charge of operations, Jeddo-Highland Coal Co.; H. H. Otto, mining engineer, Hudson Coal Co.; W. B. Geise, purchasing agent, Susquehanna Collieries Co.; E. Weichel, general superintendent, Hudson Coal Co.; two years, J. H. Connolly, president, Pennsylvania Coal Co.; E. V. Evans, vice president and general manager, Lehigh Navigation Coal Co.; three years, H. W. Montz, mining engineer, Lehigh Valley Coal Co.; George A. Roos, general manager, Philadelphia & Reading Coal & Iron Co.; C. A. Gibbons, general manager, Susquehanna Collieries Co.; W. C. M. Butler, president and general manager, Central Pennsylvania Quarry, Stripping and Construction Co.; Harold Smyth, president and general manager, St. Clair Coal Co.

•

To Open New Pike County Mine

Plans for a new coal mine in Pike County, Kentucky, from which coal is to be shipped about Jan. 1, were announced July 10 by C. A. Hamill, president, Sycamore Coal Co. The plant will be known as Cinderella Coal Corporation, subsidiary of Sycamore, and will be served by a 4-mile spur track to properties in Martin and Pike counties constructed by the Norfolk & Western Ry., which recently obtained permission from the War Department for a bridge across Tug River

at Nolan. The new Cinderella plant will be along Big Creek, which enters Tug River at Nolan.

This will be the second large mine to be opened in eastern Kentucky within a year, one having recently been opened by the Princess-Elkhorn Coal Co. in Floyd County, to which the Chesapeake & Ohio Ry. built a 10-mile spur from West Prestonsburg.

Mr. Hamill said that the new production would be from an undeveloped seam that the company had not yet named. In its application to the Interstate Commerce Commission for the bridge and spur, the N. & W. said: "the area is underlaid with extensive deposits of high-volatile coal of excellent quality for which there is a ready market." The mine, when running full, is expected to employ 300 men.

•

Labor Members of Coal Boards Named by U.M.W.

Employees' representatives have been designated by the Bituminous Coal Division on the 22 bituminous coal producers' boards. The United Mine Workers selected the men after the Division found that the U.M.W. represented the preponderant number of mine workers in each district. Following are the designees:

District 1 (Eastern Pennsylvania)—James Mark, president, District 2, U.M.W., Clearfield, Pa.

District 2 (Western Pennsylvania)—P. T. Fagan, president, District 5, U.M.W., Pittsburgh, Pa.

District 3 (Northern West Virginia)—C. F. Davis, president, District 31, U.M.W., Fairmont, W. Va.

District 4 (Ohio)—John Owens, president, District 6, U.M.W., Columbus, Ohio.

District 5 (Michigan)—John Hatton, president, District 24, Saginaw, Mich.

District 6 (West Virginia Panhandle)—George W. Savage, secretary-treasurer, District 6, U.M.W., Columbus, Ohio.

District 7 (Southern West Virginia and Virginia "Smokeless")—William Blizzard, Charleston, W. Va.

District 8 (Southern West Virginia, Eastern Kentucky, Western Virginia and part of Tennessee)—Samuel Caddy, president District 30, U.M.W., Lexington, Ky.

District 9 (West Kentucky)—Edward J. Morgan, president, District 23, U.M.W., Madisonville, Ky.

District 10 (Illinois)—Ray Edmundson, president, District 12, U.M.W., Springfield, Ill.

District 11 (Indiana)—Louis Austin, president, District 11, U.M.W., Terre Haute, Ind.

District 12 (Iowa)—Louis Boldrini, president, District 13, U.M.W., Albia, Iowa.

District 13 (Alabama)—William Mitch, president, District 20, Birmingham, Ala.

District 14 (Arkansas-Oklahoma)—David Fowler, president, District 21, U.M.W., Muskogee, Okla.

District 15 (Missouri-Arkansas-Oklahoma)—Henry Allai, president, District 14, U.M.W., Pittsburg, Kan.

District 16 (Northern Colorado)—O. F. Nigro, secretary-treasurer, District 15, U.M.W., Denver, Colo.

District 17 (Southern Colorado)—Frank

Hammer away, Joe

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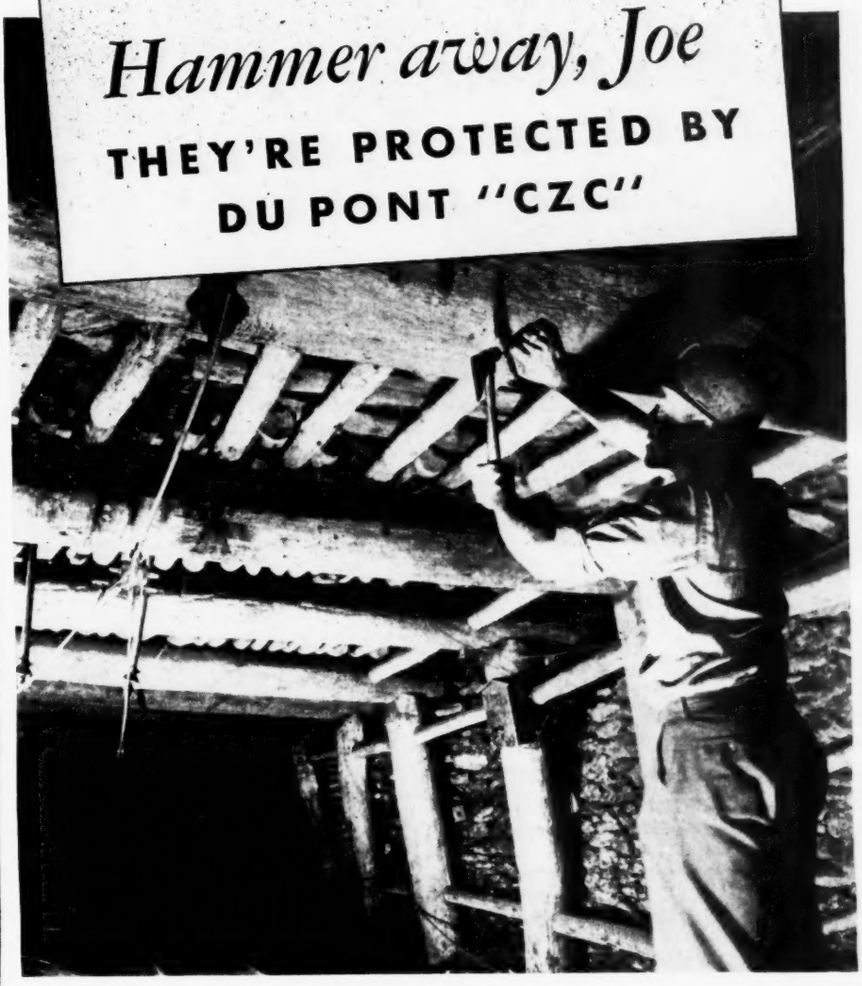

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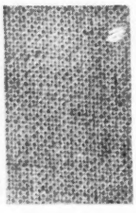

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District 18 (New Mexico)—Eben Jones, Raton, N. M.

District 19 (Wyoming)—James Morgan, Cheyenne, Wyo.

District 20 (Utah)—Alfred Carey, president, District 22, U.M.W., Rock Springs, Wyo.

District 22 (Montana)—W. A. Boyle, president, District 27, U.M.W., Billings, Mont.

District 23 (Washington)—Richard Francis, secretary-treasurer, District 10, U.M.W., Seattle, Wash.

•

Progressive Union Named Agent At Kentucky Mine

The Progressive Mine Workers was upheld as bargaining agent for about 650 employees of the Wisconsin Steel Co. coal mine at Wiscoal, near Benham, Ky., by Philip G. Phillips, of Cincinnati, regional director of the National Labor Relations Board. The decision was made known July 9 to John R. Kane, P.M.W. counsel, following a two weeks' hearing held on an appeal by the United Mine Workers.

The U.M.W. protested the conduct of an N.L.R.B. election held at the mine on May 10, charging the labor board with being unfair, the P.M.W. with electioneering and the coal company with interference. In a letter to Mr. Kane, Director Phillips said that there was "no ground for setting aside the election."

The N.L.R.B. ordered the Gallup American Coal Co., Gallup, N. M., late in June to cease discouraging membership of its employees in the U.M.W. and to reinstate six discharged employees with back pay. Charges of discrimination against union members were filed with the labor board in September, 1940.

•

U.M.W. Agent for T.C.I.R.

The United Mine Workers (Congress of Industrial Organizations) has emerged as the bargaining agency for miners of the Tennessee Coal, Iron & Railroad Co.'s four coal mines in Alabama in an election held under the auspices of the National Labor Relations Board. A considerable number of the mine workers of the company belong to a union affiliated with the American Federation of Labor.

•

Coal and Labor Funds Approved

Among provisions in the annual appropriation bills rushed through Congress at the close of the fiscal year were certain coal and labor funds of interest. The Second Deficiency Bill, now Public Law No. 150 (H. R. 5166), included $729,000 for the Bureau of Mines to carry out the terms of the Coal Mine Inspection law enacted at this session. Also included was $205,000 for the reestablished office of Bituminous Coal Consumers' Counsel.

The Labor-Federal Security Bill (H. R. 4926), now Public Law No. 146, in its appropriations for the Labor Department provided $444,300 for the Conciliation Service, with $275,000 for national defense purposes. For the Wage and Hour Division it included $4,697,700 in salaries and $326,500 in miscellaneous expenses. Also in this measure was an appropriation of $2,953,100 for the National Labor Relations Board.

•

New Preparation Facilities

Berwind-White Coal Mining Co., Mine No. 40, Windber, Pa.: Contract closed with Roberts & Schaefer Co. for crushing facilities, conveying and elevating equipment to crush lump coal to ¾-in.; capacity 235 t.p.h.; also 6-ft. Stump Air-Flow cleaning unit complete with elevating, conveying and other necessary equipment; capacity, 50 t.p.h.; additions to existing equipment; to be completed about Dec. 1.

Carbon Fuel Co., Mine No. 5, Republic, W. Va.: Contract closed with Kanawha Mfg. Co. for complete four-track rescreening tipple having feed capacity of 200 t.p.h. of 0x5-in. coal; equipped with Parrish type high-speed shaker screens, belt-type loading booms, crushing and reassembling machinery and 100-ton circular steel storage bin for slack coal.

Crystal Block Coal & Coke Co., Rawl No. 1 Mine, Rawl, W. Va.: Contract closed with Kanawha Mfg. Co. for Kanawha-Belknap washer to clean 30 t.p.h. of 3x2-in. stove coal.

Dunedin Coal Co., Dunedin Mine, Terry, W. Va.: Contract closed with Kanawha Mfg. Co. for cleaning equipment consisting of Kanawha-Belknap washers to clean stove and nut coal; capacity, 30 t.p.h. in each unit.

Dye Coal Co., Dyco Mine, Hopedale, Ohio: Contract closed with Morrow Mfg. Co. for screening plant to size and load lump, egg and nut-slack coal; capacity, 125 t.p.h. of mine-run; to be completed about Sept. 1.

National Mining Co., No. 3 mine, Muse, Pa.: Contract closed with Roberts & Schaefer Co. for complete preparation plant to be added to present tipple, to consist of facilities for crushing mine-run, for screening and washing 6x⅜-in. coal, and making five prepared sizes; cleaning facilities to include launder-type hydroseparators and Hydrotator; capacity, 500 t.p.h.; to be completed Feb. 1, 1942.

No. 9 Coal Co., Pittston, Pa.: Contract closed with Finch Mfg. Co. for one 4-ft. Menzies cone separator to clean No. 4 buckwheat; capacity, 22 t.p.h.

Rail & River Coal Co., Mine No. 4, Stewarts, Ohio: Contract closed with Morrow Mfg. Co. for addition to existing tipple for preparing lump, nut and slack; equipment to consist of apron feeder, shaking screens, picking table, refuse conveyor, slack conveyors and loading boom; capacity, 250 t.p.h. of mine-run; to be housed in steel structure; to be completed about Oct. 15.

Red Jacket Coal Corporation, Junior Tipple, Red Jacket, W. Va.: Contract closed with Morrow Mfg. Co. for new steel headhouse at upper seam including trip feeder, rotary dump, 60-ton dump bin, plate feeder and belt conveyor; capacity, 350 t.p.h. of mine-run; to be completed about Oct. 15.

Republic Steel Corporation, Virginia Mine, Virginia, Ala.: Contract closed with Roberts & Schaefer Co. for complete mine-

run tipple and Bradford breaker equipment consisting of rotary dump and refuse-disposal machinery, 300-ton coal and 50-ton rock bin, four-car rotary dump; capacity, 250 t.p.h.; to be completed Oct. 1.

STEAM FUELS Co., Forest City, Pa.: Contract closed with Wilmot Engineering Co. for fine-coal cleaning plant; equipment to consist of 6-ft. Hydrotator and 12-ft. classifier for Nos. 4 and 5 buckwheat.

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Obituary

JAMES BARNES HILTON, president of the Columbus Mining Co., with headquarters in Chicago and operations in Perry County, Kentucky, died July 20 at his home in Chicago after a long illness. He became associated with Arthur Allais in the coal business in 1909, becoming an officer and director of the Columbus company when it was formed in 1915. He succeeded to the presidency in 1937 at the time of Mr. Allais' death.

GEORGE B. AGNEW, president of the Gauley Mountain Coal Co., Ansted, W. Va., died late in July at his New York residence. He was also active in New York financial circles.

DANIEL H. PRITCHARD, 45, of Charleston, W. Va., president of the Chilton Block Coal Co. and of three other mine operating companies, died July 14 of a heart attack while en route from Charleston to Binghamton, N. Y. His father was a pioneer coal man of Mercer County, West Virginia. The Chilton Block company operates Ethel No. 2 mine in Logan County. A mine adjoining Ethel No. 2 Mr. Pritchard operated under the name Dan H. Pritchard Contractor No. 2. He also operated two mines in Mingo County: William Ann mine, of Dan H. Pritchard Contractor, at Delbarton, and New Century mine, of the New Century Coal Co., Ragland. He is survived by three brothers in the coal industry: W. E., of Huntington, and Thomas H. and Robert C., of Delbarton.

W. J. NISBET, 69, president of the Providence Coal Mining Co., died July 7 at his home in Providence, Ky., after an illness of several days. Born in Madisonville, Ky., Mr. Nisbet went to Providence in 1891, being the oldest coal operator in western Kentucky in point of service. He designed much of the mining equipment used by his company.

R. N. MAGILL, 81, purchasing agent for the Alabama By-Products Corporation until his retirement a year ago, died July 10 in Birmingham, Ala. A native of Georgia, he went to Birmingham in 1907 to take the position of purchasing agent for the Pratt Consolidated Coal Co., which he served in that capacity until its merger with the Alabama By-Products Corporation, with which he continued in a similar capacity until his retirement.

GEORGE LAWTON, 84, pioneer operator in the New River field of West Virginia, died June 30 of uremic poisoning at Oak Hill, W. Va. He was president of the Laurel Creek, Greenwood and Coal Run coal companies, as well as the Branch Coal & Coke Co., all with operations in Fayette County.

CJB AHLBERG PROVIDES all types of BEARINGS

STANDARD Ahlberg (CJB) Ball Bearings, Ball Bearing Pillow Blocks and Bower "Super-Finished" Roller Bearings suit practically all application requirements.

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Ahlberg (CJB) Ball Bearings have large balls and deep-grooved rings for extra capacity, mirror-finish surfaces for smooth performance. Mounted units have sturdy housings. improved seals, better alignment features. Bower Roller Bearing raceways are "Super-Finished" to 3-millionths-of-an-inch accuracy for permanent close adjustment and quiet operation.

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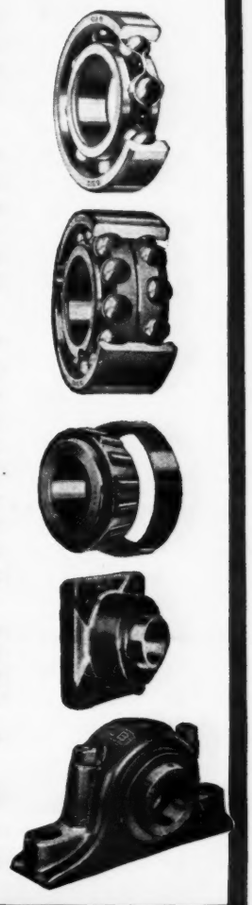

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Manufacturers of (CJB) Master Ball Bearings
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No Screen Frame Breakage
No Tearing up Screen Cloth along the Sides
No Power Waste
Operates at full capacity and efficiency with 1 H. P. motor
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Inside Mine Drilling.

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Pre-Grouting For Mine Shafts. Solidification of Wet Mine Areas.

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Wells and Discharge Holes Drilled and Grouted.

1200' - 2¼" Core — Oil Hydraulic

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DROP FORGED SWIVEL COUPLINGS

PITTSBURGH

KNIFE & FORGE CO.

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PITTSBURGH, PENNSYLVANIA

Anthracite Output Wanes, Value Up, in 1940

Output of Pennsylvania anthracite mines in 1940 totaled 51,484,640 net tons valued (at breaker, washery or dredge) at $205,490,000, according to figures by the U. S. Bureau of Mines. These totals compare with 51,487,377 tons valued at $187,175,000 in 1939; 46,099,027 tons valued at $180,600,000 in 1938; 51,856,433 tons valued at $197,599,000 in 1937, and 54,579,535 tons valued at $227,004,000 in 1936.

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Coal-Mine Accident Fatality Rate Shows Slight Decline

Accidents at coal mines of the United States caused the deaths of 96 bituminous and 13 anthracite miners in May last, according to reports furnished the U. S. Bureau of Mines by State mine inspectors. With a production of 43,400,000 net tons, the accident death rate among bituminous miners was 2.21 per million tons, compared with 2.26 in May, 1940.

The anthracite fatality rate from accidents in May last was 3.37, based on an output of 3,858,000 net tons, against 4.30 in the corresponding month a year previous.

For the two industries combined, the accident fatality rate in May last was 2.31, compared with 2.47 in the fifth month of last year.

Fatalities during May last, by causes and States, as well as comparable rates for the first five months of 1940 and 1941, are shown below.

Industrial Notes

JOY MFG. CO., Franklin, Pa., announces that Charles F. Ball has become its director of engineering. He was formerly chief engineer of the construction division of Chain Belt Co., Milwaukee, Wis.

HERCULES POWDER CO., Wilmington, Del., has appointed Theodore M. Switz as director of its export department. Formerly assistant director of the department, he succeeds P. W. Meyeringh, recently elected vice president and member of the executive committee. The company has purchased the synthetic resin business of John D. Lewis, Inc., Providence, R. I.

STORAGE BATTERY DIVISION, PHILCO CORPORATION, begins operations this month in a recently acquired plant at Trenton, N. J., where its productive capacity will be three times as great as formerly. W. M. Heinritz, general manager of the division, will be assisted in its management by Harvey N. Stover, engineering manager, and Phil S. Harvey, sales manager.

HULBURT OIL & GREASE CO., Philadelphia, has been appointed sales agent for the "Sponge-Lube" process—a cellulose material developed by DuPont which, when used in combination with the proper lubricants, is said to promote marked economies. It is said to be especially adapted for journal-box lubrication on mine locomotives.

AHLBERG BEARING CO., Chicago, has appointed C. W. ("Duke") Pearsall as general sales manager. Joining the company in 1919, he has been successively salesman in Chicago and Philadelphia, then Philadelphia

UNITED STATES COAL-MINE FATALITIES IN MAY, 1941, BY CAUSES AND STATES

State	Underground: Falls of Roof	Falls of Face	Haulage	Gas or Dust Explosions	Explosives	Electricity	Machinery	Other Causes	Total Underground	Open Cut	Surface	Grand Total
Alabama	2	..	..	..	1	1	..	..	4	..	..	4
Colorado	1	..	1	..	..	..	..	..	2	..	..	2
Illinois	4	..	..	..	..	..	..	1	5	1	..	6
Indiana	1	..	..	16	..	..	..	..	17	..	..	17
Iowa	..	..	1	..	..	..	..	..	1	..	..	1
Kansas	..	..	..	1	..	..	..	..	1	..	..	1
Kentucky	5	..	..	..	..	1	..	..	6	..	..	6
Ohio	1	..	3	..	..	..	..	..	4	..	..	4
Penna. (bit.)	20	..	4	..	..	..	1	..	25	..	..	25
Tennessee	2	..	..	..	..	..	..	..	2	..	..	2
Virginia	4	..	..	..	..	..	1	..	5	..	..	5
West Virginia	14	2	5	..	..	..	2	..	23	..	..	23
Total bituminous	54	2	14	17	1	2	4	1	95	1	..	96
Penna. (anth.)	8	..	1	..	1	..	..	2	12	..	1	13
Grand total	62	2	15	17	2	2	4	3	107	1	1	109

DEATH AND FATALITY RATES AT UNITED STATES COAL MINES, BY CAUSES*

January-May, 1940 and 1941

Cause	Bituminous: Number Killed		Bituminous: Killed per Million Tons		Anthracite: Number Killed		Anthracite: Killed per Million Tons		Total: Number Killed		Total: Killed per Million Tons	
	1940	1941	1940	1941	1940	1941	1940	1941	1940	1941	1940	1941
Underground:												
Falls of roof and coal	233	194	1.245	1.059	48	42	2.325	1.994	281	236	1.352	1.156
Haulage	87	63	.465	.344	18	11	.872	.522	105	74	.505	.362
Gas or dust explosions:												
Local	6	8	.032	.044	2	2	.097	.095	8	10	.039	.049
Major	163	19	.871	.104	...	...	.....	.....	163	19	.784	.093
Explosives	12	9	.064	.049	3	4	.145	.190	15	13	.072	.064
Electricity	9	7	.048	.038	4	1	.194	.048	13	8	.063	.039
Machinery	14	15	.075	.082	1	...	.048	.....	15	15	.072	.074
Shaft	2	2	.010	.011	1	1	.048	.048	3	3	.015	.015
Miscellaneous	12	1	.064	.005	2	5	.097	.237	14	6	.067	.029
Stripping or open-cut	5	13	.027	.071	2	1	.097	.048	7	14	.034	.068
Surface	16	10	.085	.055	4	7	.194	.332	20	17	.096	.083
Grand total	559	341	2.986	1.862	85	74	4.117	3.514	644	415	3.099	2.032

* All figures subject to revision.

branch manager, later Chicago branch manager, and then manager of distributor sales.

ALLIS-CHALMERS MFG. CO., Milwaukee, Wis., has set up a priorities management department to help in directing the company's activities in matters pertaining to priorities. Its general purpose is one of coordination and assistance, not being designed to take over any of the obligations and duties previously a function of other departments. The new department will be headed by L. W. Grothaus, vice president, with Guy V. Woody, Pittsburgh district manager, as administrator and O. S. Larkby Jr. as first assistant. Messrs. Woody and Larkby have been temporarily detached from their regular organization duties while serving in this new assignment.

MECHANICAL DIVISION, B. F. GOODRICH CO., announces these changes in sales personnel: O. C. Mueller has been transferred as sales representative from Cincinnati to Pittsburgh and is succeeded at Cincinnati by A. C. Lutz; J. M. Cooney is transferred from Cincinnati to Dayton, Ohio; B. E. Silver, formerly with the manufacturers' sales department in Washington, joins the hose sales department at headquarters in Akron; J. V. Powers, sales correspondent in the New York district office, becomes field representative of the district with Albany headquarters.

LINK-BELT CO., Chicago, announces that F. V. McArthur has resigned as secretary and assistant treasurer after nearly 50 years of service. Harry E. Kellogg, treasurer and assistant secretary, has been elected secretary, also retaining the treasurership. Melbourne P. Anderson, formerly general accountant, has been made assistant treasurer, and Henry C. Oakes, statistician, has been named assistant secretary. Frank H. Brandt, hitherto accountant at the Pershing Road (Chicago) plant, has been appointed general auditor in charge of the accounting of the company.

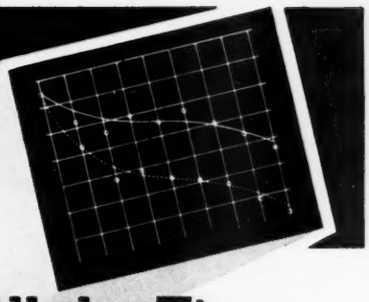
COPPERWELD STEEL CO., Glassport, Pa., has made Sidney D. Williams, formerly vice president in charge of steel sales, executive vice president in charge of the Warren (Ohio) division. William B. Klee Jr., assistant secretary, has also been named assistant to the executive vice president. Thomas F. Troxell has been elected as treasurer and a director of the company.

SULLIVAN MACHINERY CO., Michigan City, Ind., announces that Howard T. Marsh has retired on a pension after 41 years of continuous service. Upon graduation from Worcester Polytechnic Institute he joined the company as apprentice in its training course, serving successively as salesman in the Denver territory, Pacific Coast manager, London manager, vice president and director.

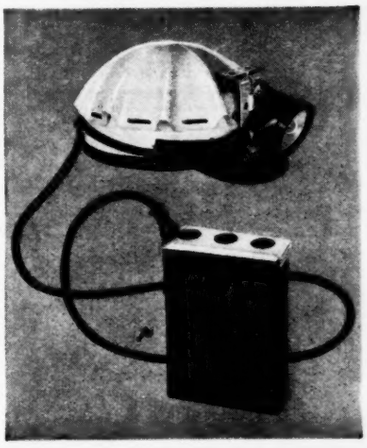
KEYSTONE CARBON CO., INC., St. Marys, Pa., has appointed these distributors: Ohio Ball Bearing Co., Cleveland, Ohio distributor; Indiana Bearings, Inc., Indianapolis, Indiana distributor; West Virginia Bearings, Charleston, West Virginia distributor.

PORTABLE LAMP & EQUIPMENT CO., Pittsburgh, Pa., has appointed Henry Schweinsberg as district representative in the Wheeling and Morgantown (W. Va.) territory. A

PORTABLE'S CAP LAMP



Gives Its All--All the Time



The graph above contrasts output curve of the lead acid battery (solid line) with that of the alkaline battery (dotted line). Note that the alkaline battery output diminishes gradually until, at the end of eight hours, power furnished is greatly reduced. The lead acid battery, on the other hand, supplies a constant amount of power every hour of the shift.

Because they employ the lead acid battery, Portable's Lamps are *guaranteed* to furnish a constant amount of light every hour, every day, as long as they remain in use. Issued under Portable's 12-month contract, renewable annually, they are the only lamps on the market to carry this guarantee.

Give your men and yourself the extra advantages of steady light—it can mean safety for them, lowered costs and more tons for you. Write for complete details of Portable's Cap Lamps. They give their all—all the time.

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TAKE NO CHANCES
With Stray Electric Currents

Expansion of high tension power lines is causing a corresponding increase in stray electric ground circuits. These may, thru defective or poor cable insulation, cause premature blast shots. You take no chances of this with

PARAGON Shot Fire Cable

Designed and made especially for safe shot firing. Insulation is double rubber—a soft core surrounding the copper conductors and over this is vulcanized a tough, hard, shock-and friction-resisting outer rubber jacket. Unequalled long life. PARAGON—the *original* all-rubber shot fire cable is the leader in popularity among the men. Write for prices in coils of any length—either solid or stranded copper conductors.

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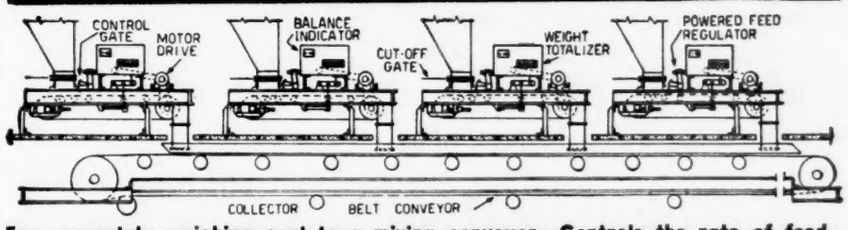

For accurately weighing coal to a mixing conveyor—Controls the rate of feed and continuously totalizes the weight delivered

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graduate in mining engineering from Carnegie Institute of Technology and West Virginia University, he was formerly associated with the Valley Camp Coal Co., Elmwood, W. Va.

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Trade Literature

ANGLE ENGINE-COMPRESSOR—Worthington Pump & Machinery Corporation, Harrison, N. J. Bulletin S-550-B19 describes Type LFC units for a variety of applications, citing outstanding features.

WATERPROOFING CEMENTS — Smooth-On Mfg. Co., Jersey City, N. J. Folder tells how to waterproof and patch concrete walls and floors; how seepage can be stopped from the inside of cellars, cisterns, etc.; how cracks and holes in concrete can be repaired and made ready for service within 12 hours, and how to make iron-hard, dustproof and waterproof floors.

Cutting

COAL CUTTER—Sullivan Machinery Co., Michigan City, Ind. Bulletin C-30 tells about the speed, power, durability and easy control of the 7-B coal cutter, which has 9-ft. bar, short over-all length for close timbering, tapered front end for full sump cut and straight rib, with smooth outline and low height for close quarters and low coal.

Electrical

INDOOR-SERVICE CIRCUIT BREAKERS—Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa. Descriptive Data 33-216 covers oil circuit breakers for indoor service, discussing advantages of operating levers inside the breaker chamber and describing breaker units, tanks, terminal bushings and "De-ion" circuit interrupters.

PLUGS AND SOCKETS, FUSE MOUNTS, TERMINALS—Howard Jones, Chicago. Catalog 11 illustrates and describes complete line of multi-contact plugs and sockets, terminals, terminal panels, fuse mounts, etc.

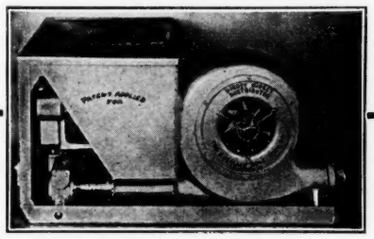
PORTABLE SUBSTATIONS — Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa. Booklet B-2281 is devoted to portable substations with voltage ratings up to 4500 kva. The various parts that make up a portable substation are pointed out, special core and heat-exchanger features and "forced-flow" cooling being described, with a note on automatic protection.

SPLICING AND FRICTION TAPE—B. F. Goodrich Co., Akron, Ohio. Catalog Section 9270 is devoted to Two-in-One tape for use in various services, describing methods of application.

Hoisting

WIRE ROPE—Hazard Wire Rope Division, American Chain & Cable Co., Wilkes-Barre, Pa. Booklet is devoted to the safe use of wire rope. It gives tables of breaking strengths for all commonly used rope constructions together with safety factors for the principal rope applications, and offers constructive information on the effects of acceleration, the various constructions and grades of wire rope, and suggestions for the

YOU CAN AFFORD A
MIDGET ROCKDUSTER
BETTER THAN A
DUST EXPLOSION



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. . . . . a portable machine that can be easily hauled on conveyor or car. Distributes more than a TON OF DUST per hour. Rock dust each room as it is loaded out, and destroy the danger at the face!

COST IS SMALL
PERFORMANCE LARGE
DELAY IS DANGEROUS

Write for bulletin and demonstration at your mine.

DO IT NOW!

THE AMERICAN MINE DOOR CO.
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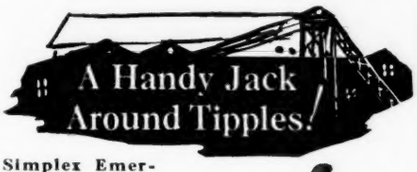

Simplex Emergency Jacks minimize shutdown time and cut maintenance costs when there's lifting, lowering, pushing or pulling to be done around tipples, washers, skip pockets, etc. They lift their full capacity on cap or toe. Extra lifting range is provided by the auxiliary cap shoe and by the hook end chain which can be slung around timbers and snubbed around uprights. Tilt on their bases for jacking at an angle. Also operate in horizontal position. It costs plenty to be without them! Three sizes: No. 522, 5-ton, No. 310-A, 15-ton, No. 2030, 20-ton. Stocked by leading supply houses.

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California, Pa. Princeton, W. Va.
Better, Safer Mine Jacks Since 1899

Simplex Jacks
dependable and efficient
Lever Type for toe and cap lifting.
Hydraulic for easier cap lifting.
Screw Jacks for economy.

correction of operating factors affecting safety such as abrasion, bending fatigue, reverse bends, kinking, spooling, crushing and corrosion.

Lubrication

LUBRICATION—Texas Co., New York. *Lubrication* for June, devoted to coal mining, describes the equipment used together with its lubrication requirements to keep it in good running order and promote long life.

OIL PURIFIERS—S. G. Frantz Co., Inc., New York. Bulletin 16-A cites uses and advantages of new Model PQ-4 permanent magnet FerroFilter for lube oil purification.

Maintenance

BALL BEARINGS—New Departure, Division of General Motors Corporation, Bristol, Conn. Handbook (15th edition) lists principal types and sizes of forged-steel ball bearings. In addition to dimensions, capacities, tolerances and mounting fits it contains new data to simplify selection of bearings for various loads and length of service.

HIGH-PRESSURE HYDRAULIC CONTROL HOSE—B. F. Goodrich Co., Akron, Ohio. Catalog Section 4030 describes the functions of hydraulic control hose, its uses and manufacturing features of the Goodrich line. Commonly used and special sizes are listed, as well as couplings, spring guards and adapter unions.

STEEL PRODUCTS—Falstrom Co., Passaic, N. J. Bulletin 101 pictures and describes fabricated metal products for all industries.

TOOL STEEL—Jessop Steel Co., Washington, Pa. Bulletin 541 cites features and applications of Jessop rapid-finishing tool steel.

Miscellaneous

METAL SPRAYING—Metallizing Co. of America, Chicago. Catalog outlines history, purpose and practice of metal spraying illustrating and describing a variety of applications.

POWER ASSEMBLY TOOLS—Black & Decker Mfg. Co., Towson, Md. Handbook contains information not only on power assembly tools but on sizes of pilot holes; bolt, nut, cap-screw and lag-screw sizes; socket wrenches; tap-drill sizes, etc.

RUBBER-BASE METAL COATING—Truscon Laboratories, Inc., Detroit, Mich. Bulletin 518 stresses salient features of Paratex metal coating, especially adapted to all types of exposed iron and steel.

SPONGE RUBBER—B. F. Goodrich Co., Akron, Ohio. Catalog Section 9790 lists standard grades and shapes, stock size and special size slabs of milled sponge rubber for sealing, cushioning and absorbing vibration.

UTILITY TOOL—Templeton, Kenly & Co., Chicago. Bulletin P&P-41 brings up to date application data on the Util-A-Tool, consisting of nine pieces of equipment used in various combinations to perform various jobs. How the tool pulls in, pushes apart, clamps, tensions; bends conduit, beams, etc.; pulls wheels, gears and pulleys, and easily per-

Stepped up defense production calls for greater efficiency. Stepped up anthracite production calls for increased and improved preparation facilities, greater capacities and uniformity control. Wilmot is prepared to provide the requirements of these "defense days" with *Hydrotators*, for modern efficient coal cleaning. Wilmot Engineering Co., Hazleton, Pa.

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A GREAT NAME IN THE COAL INDUSTRY
HYDROTATOR
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COFFING RATCHET LEVER HOISTS
ADVANCED DESIGN SPUR GEAR HOISTS
HOISTS ELECTRIC HOISTS

RATCHET LEVER HOISTS

can save time and money on these jobs . . .

- pulling overhead trolley cables
- Maintenance of dump cars
- tightening conveyor belts and chains
- skidding and installing heavy machinery
- changing screens
- changing cables on cages
- electric shovel maintenance
- raising and lowering equipment to and from deck
- changing spiders
- repairing truck frames
- straightening shafts
- lifting batteries to shuttle cars

The original ratchet lever hoist with the unusual safety feature of dual ratchet and pawl assembly with load always under control. Standard equipment at many large mines for all types of maintenance work. Operates in any position—cap. from ¾ ton—14 lbs. to 15 ton—150 lbs. Sold thru Mill Supply Houses all over the country. Send for catalog CG-4.

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Erecting a "Pennsylvania" BRADMILL for preparing PREMIUM Stoker coal.

Tests made in 3 different types, leading to selection of equipment for preparing 1¼"x⅛" Domestic Stoker coal, indicated approx. 22%, and 16% minus ⅛" from two types, with varying amounts of oversize, while the BRADMILL test showed less than 9% ⅛" and *no* oversize.

With more than $1.00 differential between Stoker coal, and the ⅛" fines, savings show early amortization of the investment made in the BRADMILL.

On receipt of your Stoker Coal specifications, we will be glad to make recommendations and quotation on indicated equipment.

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Liberty Trust Bldg. Philadelphia

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forms other labor- and time-consuming jobs is pictured.

Power

BELTING—B. F. Goodrich Co., Akron, Ohio. Catalog Section 2140 discusses construction and advantages of Multicord belts, including the application of the Plylock splice to make belts endless on the pulleys in the plant. Tables of minimum pulley diameters and approximate weights of 100-ft. lengths of varying widths are included.

FRACTIONAL-HORSEPOWER V-BELTS—B. F. Goodrich Co., Akron, Ohio. Catalog Section 2181 describes the balanced construction of the company's V-belt and the advantages of V-drives, including tables on standard fractional-horsepower V-belts.

INTEGRAL GEAR UNITS—Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa. Folder F-8603 describes integral gear units for generators, compressors, pumps, lineshafts and other equipment to be driven slower than efficient turbine speeds. Gear construction, bearings and forced feed lubrication are among the features explained.

POROUS BEARINGS—Keystone Carbon Co., St. Marys, Pa. Catalog lists additions to the line of "Selflube" porous bearings, describing their properties and uses and furnishing details on correct method of installation.

V-SHEAVES AND PULLEYS AND BELTS—Thermoid Co., Trenton, N. J. Engineering manual gives complete information on Thermoid multiple and fractional horsepower V-belt and drives.

Power Plant Equipment

SPREADER STOKER—Combustion Engineering Co., Inc., New York City. Catalog SS-2 describes the latest design features of the C-E spreader stoker, giving illustrations of assemblies and typical installations, together with close-up views of feeder, distributor, drive mechanism, and dump grate details.

Preparation

CENTRIFUGAL DRYERS AND CLARIFIERS—Centrifugal & Mechanical Industries, Inc., St. Louis, Mo. Bulletin gives C-M-I continuous centrifugal facts, describing operating principles, design and construction, and capacities and power requirements.

GLOBE AND ANGLE VALVES—Reading-Pratt & Cady Division, American Chain & Cable Co., Inc., Reading, Pa. Folder covers new improvements on union bonnet bronze globe and angle valves, listing types and features.

Pumping and Drainage

CENTRIFUGAL PUMPS—Worthington Pump & Machinery Corporation, Harrison, N. J. Bulletin W-304-B2 stresses features of Type U two-stage centrifugal pumps, including specifications and construction and diagram.

PIPE COUPLING—Dillon Co., Tulsa, Okla. Bulletin describes Dillon Multi-Seal couplings designed for great strains, providing security in extra seals, automatically self-aligning and with other important features.

ROTARY PUMPS—Worthington Pump & Machinery Corporation, Harrison, N. J. Bulletin W-483-B1 cites advantages, features and applications of rotary pumps with double-helical gears, giving viscosity conversion table.

Safety

GUARD AND PROTECTORS—B. F. Goodrich Co., Akron, Ohio. Catalog Section 5320 covers trolley-wire guard and blasting-cap protectors.

Stripping

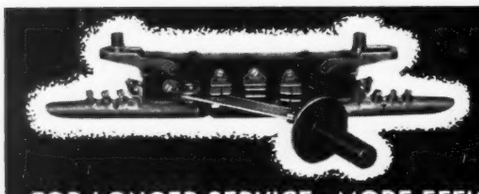
SHOVEL AND DRAGLINE PARTS—American Manganese Steel Division, American Brake Shoe & Foundry Co., Chicago Heights, Ill. Bulletin 641-S is devoted to power shovel and dragline parts, while Bulletin 641-D covers power-shovel dippers and dipper parts; illustrations are a feature.

TRACTORS AND BULLDOZERS—Buckeye Traction Ditcher Co., Findlay, Ohio. Bulletin U-1 describes and illustrates Buckeye Unitilt tractor equipment, stressing nine features and 20 uses.

Transportation

BULK-FLOW CONVEYOR—Link-Belt Co., Chicago. Book No. 1975 describes design, operating advantages and typical arrangements of the Bulk-Flo power-operated conveyor system.

HYDRAULIC BRAKES FOR MINE LOCOMOTIVES—Westinghouse Air Brake Co., Wilmerding, Pa. Bulletin S.P. 9092 details features and advantages of Westinghouse hydraulic brake equipment on small mine locomotives having space limitations that preclude the installation of air brakes.



MESCO INSULATOR SWITCHES

FOR LONGER SERVICE - MORE EFFICIENCY

Mesco Trolley Section Switches are rugged--yet they are precision-built, for safety and efficiency. Available in all types and sizes, for use with any size trolley wire or feeder cables. Switch blades can easily be changed from right to left hand.

Find out how Mesco Switches can step up haulage efficiency, cut power losses in your mine. Write today.

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Rail Bonds, Welding Machines; Trolley Frogs, Splicers, Wheels, Poleheads, Harps, Gliders and Ground Clamps. Distributors in all leading coal centers; prompt service assured.

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RUGGED-YET SENSITIVE
KOEHLER FLAME SAFETY LAMP

The Koehler Flame Safety Lamp has two features that insure protection in the mine.
FIRST—Better Ventilation.
SECOND—Greater GAUZE AREA, for increased sensitivity.
It is rugged, simple and dependable. Will withstand the most constant use and give the most satisfactory service at lowest operating and maintenance cost. The Koehler is as modern as "mechanization" and a "must" in every mine that wants the best in protection.

KOEHLER SAFETY LAMP

WHEAT CAP LAMP

KOEHLER MFG. CO.
Marlboro . . . Mass.
Eastern Bituminous: WHEAT LAMP SALES, INC., 1501 Kanawha Valley Bldg., Charleston, W. Va.

RUGGED - DEPENDABLE SENSITIVE

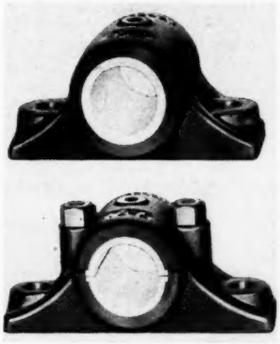
TWINS OF MODERN MINING

BETTER LIGHT - LESS WEIGHT NON-SPILLABLE

WHAT'S NEW IN COAL-MINING EQUIPMENT

BEARINGS

A new and improved line of solid and split journal bearings, carried in stock and neatly cased and labeled for prompt delivery, is announced by the Jeffrey Mfg. Co., Columbus, Ohio. Of accurate dimensions, with rounded lines and smooth gunmetal finish, these precision-made bearings have machined bases and faced ends. Height to center line of shaft is rigidly maintained. The babbitted cores are broached to smooth hard surface and require no "wearing in."



Both styles are tapped for grease or aperture fittings. An ample storage groove in the top provides proper distribution of lubricant. In addition, the split bearing has feeder grooves on each side. Individual containers are furnished for easy handling and protection in shipping.

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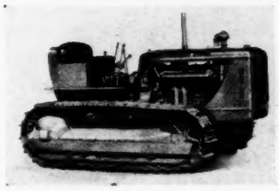
TRACTORS

A new 55-hp. diesel tractor, designed for greater capacity and speed without increased operating costs, is announced by Caterpillar Tractor Co., Peoria, Ill. Although the tractor weighs more than 8 tons, it can be steered as easily as an automobile. A separate control unit does the work by hydraulic pressure when only 14 lb. of pull is exerted on the steering clutch levers.

The tractor has been "geared to the job" with nine practical working speeds; five are forward, offering a range of from 1.4 to 5.8 miles an hour, with the standard transmission group. For each of these first four forward speeds there is a corresponding by slightly higher reverse; and the motion of the tractor can be reversed by merely pushing or pulling a single lever. An optional transmission group, giving speeds spaced from 1.7 to 5.3 miles an hour, is available.



A rubber-tired industrial tractor, the DW-10, powered by a 90-hp diesel engine and capable of hauling more than 13 tons of earth at 18 miles an hour, also is offered by Caterpillar. The company likewise has designed and built an 11-cu.yd. heaped-measure bottom-dump pneumatic-tired wagon to go with the new tractor. Hydraulic scrapers, especially designed for the machine, are manufactured by the LaPlant-Choate Mfg. Co., Inc., of Cedar Rapids, Iowa, and cable-controlled scrapers by R. G. LeTourneau, Inc., Peoria, Ill.

The W-10 wagon has an 8½-cu.yd. struck-measure capacity; the body is of the hopper type to provide a large target, insuring economical loading operations with any type of loading equipment. A rear bumper is provided on the wagon to facilitate dumping or loading operations where a pushdozer is required; it also acts as protection to the rear wagon tires. Rear tires on the tractor and wagon are the same size—18x24, 6-ply. The tractor-wagon combination weighs 24,500 lb. and measures 32 ft. 8 in. in length.

HYDRO CLASSIFIER

Hardinge Co., York, Pa., announces some noteworthy improvements in its hydro classifier. It consists of a circular steel tank divided into two compartments, a main or upper one equipped with an adjustable overflow weir in which agitating and collecting spiral rakes operate and a conical-shaped lower one where a final wash is given the product being made.

The simple means now used permits making various sizes of product on one machine by varying the volume available for retention and at the same time the settling-out period in it. This is accomplished by using a telescopic type peripheral weir, which permits varying the classifier depth from a maximum operating depth to one-half of its maximum, or at any in-between point. The machine, operated by a motor through an inclosed oil-lubricated drive gear, includes the "Auto-Raise" feature to prevent damage from sudden overloads. Power requirements are small, a 1½-hp. motor being sufficient to operate a 20-ft.-diameter classifier.

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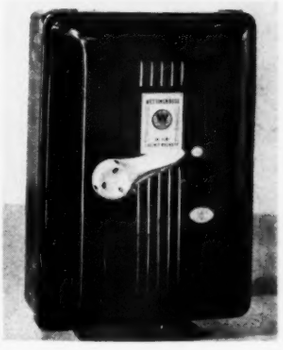
BALL-BEARING MOTORS, CIRCUIT BREAKER

New, smaller a.c. squirrel-cage ball-bearing induction motors especially designed for general-purpose industrial machinery-drive applications are offered by the Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa. These new CS motors are available in ratings from ½ to 5 hp., with speeds from 875 to 3,600 r.p.m., for operation on 110, 220, 440 and 550 volts, 2- and 3-phase a.c. Greatest of the improvements incorporated is the new "permanently sealed" ball bearing which requires lubrication only once every three years. Double-row bearing width gives 50 per cent greater shaft contact area, with consequent longer bearing life and reduced shaft wear.

New specially developed plastic wire coating gives maximum dielectric strength, toughness and flexibility. Reinforced cuffs at slot edges protect windings from abrasion, and coil ends are taped to brace them against the strains of full voltage starting. Rigid one-piece cast frame assures stiff support for the rotor and over-all structural rigidity.

A new "De-ion" inclosed circuit breaker designed for protection of all types of light and



power circuits also is announced by Westinghouse. This new Type AB-1 unit is made in four frame sizes, including ratings from 15 to 600 amp. in steps corresponding to commercial wire sizes. All are available with voltage ratings from 250 a.c., 125/250 d.c. to 600 a.c., 250 d.c.

Distinctive features common to all frame sizes are: silver contacts operated by a toggle mechanism to provide quick "make" or "break" action; bimetal thermal elements to prevent tripping due to harmless overloads; rust- and corrosion-resisting metal parts; and the "De-ion" method of arc quenching. This feature confines, divides and extinguishes the arc almost instantly as the contacts open, providing long contact life and reducing fire hazard.

Inclosed in a water- and dust-

tight steel case, the breaker requires a mounting space 40 per cent less than for conventional fused safety switches of the same ratings. Operating handle is on the front, thus permitting close banking.

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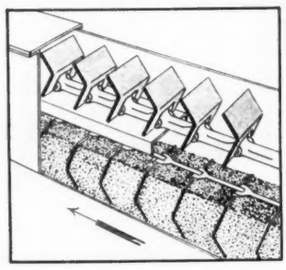
BULK-FLOW CONVEYOR

Describing it as a "distinctly new and different power-operated conveyor system for the positive and continuous conveying of flowable granular, crushed, ground or pulverized materials of a non-corrosive, non-abrasive nature, in capacities of 1 to 140 tons per hour," Link-Belt Co., Chicago, offers the new "Bulk-Flo" conveyor. Features stressed by the company include low first cost, simplicity and compactness, minimum supporting structure, self-feeding and self-clearing design, slow operation within a dust-tight casing, gentle and quiet movement of material, and relatively low power consumption.

The conveying medium is a specially designed chain to which solid peak-top flights are at-

tached at every pitch. These divide the material in the conveyor duct into a continuous series of batches which are moved positively by the peak-top flights whether there be a full or only a partial load.

"Bulk-Flo" elevating-conveying units may be installed horizontally, inclined, vertically or curved, and a single "self-contained unit may carry in all these directions in the same vertical plane. They may be fed or loaded at various points to suit conditions. Feed and discharge openings—also openings for inspection and access—are readily provided in the conveyor casing according to the dictates of the individual installation." The unit, the company states, requires one-fifth the cross-section of the bucket conveyor of corresponding capacity, one-third that of a belt conveyor and about one-fourth that of a flight conveyor. Its ability to load itself from hop-



pers, bins or chutes obviates the need of a separate feeder. One continuous "Bulk-Flo" conveyor, it is pointed out, often may serve where several units of other types would be required.

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MULTIPLE V-BELTS

The Cincinnati Rubber Mfg. Co., Cincinnati, Ohio, has entered the field of multiple V-belts and can supply all standard sizes as regularly required for multiple V-drives. These belts have a heavy elastic fabric envelope which takes up the outside wear, permits ready flexing and holds tightly to the groove. The load is carried by a cord section of high-tensile low-stretch cords thoroughly impregnated with liquid rubber and then embedded in a cushion of rubber providing lengthwise flexibility and easy flexing around the pulleys. Uniform cross-sections enable each belt to seat itself perfectly in the groove. Each belt is matched so that it will carry its equal share of the load.

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MAGNETIC SEPARATOR

Stearns Magnetic Mfg. Co., Milwaukee, Wis., announces that its spout-type magnetic separator has been streamlined, modernized and simplified and now operates with much fewer parts. The magnetic coils are now protected by aluminum plates provided with spacious louvers to allow plenty of ventilation, yet designed to keep out dirt and dust. The former gate-operating bar has been replaced by a simple arrangement of toggle plate which opens and closes the safety gate automatically as the current is turned off or on.

Other improvements for a.c. operation include a new type rectifier, a more compact, trouble-free unit than the old copper-oxide model, being less susceptible to damage by dust, dirt or atmospheric conditions. The Stearns spout magnet is furnished in sizes from 8 to 20 in. wide and operates from 110- or 220-volt a.c. and d.c. Where small-capacity requirements are satisfactory, the Junior Type B unit is available.

SUSPENSION INSULATORS

To reduce breakage of suspension insulators on lower-voltage lines, the Ohio Brass Co., Mansfield, Ohio, has developed three small-diameter units with a smooth under surface and heavy porcelain sections. Being free of the deep petticoats located on the under side of standard suspension insulator disks, these units allow bullets to ricochet off the surface without causing damage in most cases. The greater impact resistance of the heavier-sectioned porcelain helps reduce

breakage from rock throwing, falling objects, and rough handling during shipment and installation.

Elimination of petticoats lowers the electrical flashover values only slightly. The three insulators include a 6-in. 10,000-lb. unit with clevis cap and eye pin, and two 7½-in. 15,000-lb. units, one with socket cap and ball pin, and one with clevis and clevis pin.

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CONVERTING SCREENINGS INTO COARSE FUEL

A new process for converting screenings or other fine coal into coarse fuel is offered by E. Evan Jones, Richlands, Va., who reports his readiness to discuss the question of installation with interested persons or organizations. Processing cost, Mr. Jones states, is but a few cents per ton, and the operation consists essentially of heating the coal and pressing it into lumps by means of a roller working over a conveyor.

As the fine coal comes onto the conveyor, it is heated to the proper temperature by means of a furnace and then passes under the roller for formation into lumps of different sizes and shapes. The lumps then fall into a water-filled cooling tank, from which a conveyor removes them and deposits them in railroad cars or trucks.

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LUBRICATION PUMPS

New and efficient lubrication barrel pumps especially designed for heavy-duty usage are offered by the Alemite Division, Stewart-Warner Corporation, Chicago. One type a volume barrel pump for 400-lb. oil drums (models 6701, 6702 and 6705), operates with a 40-to-1 piston delivering up to 6 lb. of regular semi-solid lubricant per minute. When equipped with a 7-to-1 piston this pump can deliver up to 15 lb. per minute.

For medium and smaller set-ups, where requirements are less severe, A emits Standard and Master grease pumps are designed for use directly on lubricant drums (model numbers: Standard—7294; Master—7300) In both high- and low-pressure models these two pumps are equipped to fit both 100- and 400-lb. oil drums. The new air-operated motor oil pump (Model 7710) is capable of delivering 5 gal. of S.A.E. 10 oil per minute and 3 gal. of S.A.E. 60 per minute. This pump is adjusted to fit directly on the original 55-gal. oil drum. It is equipped with an Aldure air valve.

All the Alemite heavy-duty volume pumps are equipped with the Dynamatic primer, enabling pumps to handle heavy fibrous lubricants with ease. All pump castings are of fine-grain cast iron of high tensile strength. Wearing surface of the cylinder is hard chrome plated over cast iron, assuring lasting service.

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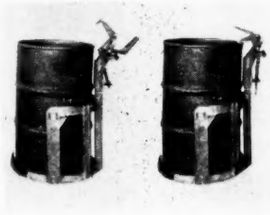
BARREL-DUMPING HARNESS

Lewis-Shepard Sales Corporation, Watertown, Mass., presents a new, quick-locking harness to speed up and make more efficient the handling and dumping of



barrels and drums. A barrel-hoop truck deposits the drum directly into the harness. The harness is equipped with a spring toggle, is arc-welded throughout, and can be made for any size of drum.

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TRANSFORMER

Wagner Electric Corporation, St. Louis, Mo., announces a new type transformer known as the Noflamol. These transformers are filled with a non-inflammable synthetic liquid developed as an improvement over regular transformer oil. Because of the non-inflammable characteristics of this liquid, these units can be installed indoors without the use of fireproof vaults. In addition to this saving on installation expense several other advantages are claimed by the manufacturer.